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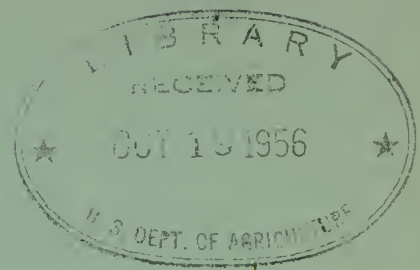
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STATION'S QUARTERLY REPORT

3rd Quarter
Calendar Year 1949



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Not For Publication

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STATION'S QUARTERLY REPORT

3rd Quarter
Calendar Year 1949

GENERAL

by Marian Thomas

The Washington Office assignment, in which the Director was assisted by Rettie, Banks, and Larson, was completed early in August. The study disclosed that the nonfederal forest research effort has increased very rapidly during the past 10 years to a level where it now greatly exceeds the corresponding expenditures being made by the Federal Government. The largest expenditures by nonfederal agencies are in the field of forest products research, but even in the fields of forest management and forest resources investigations the nonfederal expenditures for research come very near matching the Federal funds that are being appropriated. A large part of the nonfederal expenditures are for projects that are carried on either cooperatively or in correlation with the Forest Service program.

The Northeastern Forest Research Advisory Council held its annual meeting on September 8 at Jackson's Mill, West Virginia. Reports on a number of major Station activities were presented including forest genetics, forest survey, forest utilization service, flood control surveys, etc. Council members from West Virginia presented a summary of the major land use problems of that State. Officers elected for the ensuing year are as follow: Chairman, Paul Koenig (P. H. Glatfelter Paper Co., Spring Grove, Pa.); Vice Chairman, C. R. Orton (West Virginia University, Morgantown, West Virginia); Secretary, V. L. Harper.

A progress report on the forest survey in New York State was presented by Rettie at the recent meeting of the Special Committee on Forestry of the State of New York Joint Legislative Committee on Interstate Cooperation. This representative group of legislators and citizens, chaired by Assemblyman Harold C. Ostertag, have been giving intensive study to a wide range of forestry problems. The Committee has initiated a number of important pieces of forestry legislation.

A number of personnel changes have taken place during the quarter. Ineson accepted a two-year assignment as Head of the Forest Economics Branch, Division of Forestry, Natural Resources Section of General McArthur's staff in Tokio, Japan. Rettie has been shifted to the position of Chief of the Division of Forest Economics in the Station. George Mullin transferred to the position of Assistant Supervisor of the White Mountain National Forest. Alessio Caporaso shifted to Upper Darby to become Forest Survey Field Supervisor. Adrian Gilbert returned to the Station from a year's educational leave in Switzerland. Malcolm Williamson went on educational leave for graduate study at Yale School of Forestry.

QUARTERLY REPORT — EDITOR

JULY-SEPTEMBER 1949

by E. vH. Larson

STATUS OF PUBLICATIONS

Published During Quarter

Bratton, Allen W.

1949. Cooperatives and small woodlands.
U. S. Dept. Agr. Yearbook, 1949: 183-190.

Doverspike, George E.

1949. Preliminary survey of markets and prices of forest products in the Del-Mar-Va Peninsula. Northeast. Forest Expt. Sta. Paper 27. 27 pp., illus. (Processed.) Upper Darby.

Filip, S. II.

1949. Thinning young oak stands for small mine timbers—at a profit. Northeast. Forest Expt. Sta. Paper 28. 13 pp., illus. (Processed.) Upper Darby.

Forest Survey.

1949. Forest statistics for Monongahela Section, West Virginia. Northeast. Forest Expt. Sta. Forest Survey Release 6. 34 pp. (Processed.) Upper Darby.

1949. Forest statistics for southeastern West Virginia. Northeast. Forest Expt. Sta. Forest Survey Release 7. 35 pp. (Processed.) Upper Darby.

1949. Forest statistics for Cumberland Mountain Section, West Virginia. Northeast. Forest Expt. Sta. Forest Survey Release 8. 35 pp. (Processed.) Upper Darby.

Larrimer, W. H., and Schreiner, Ernst J.

1949. Arboretums; places of beauty and science.
U. S. Dept. Agr. Yearbook 1949: 398-402.

McQuilkin, W. E.

1949. Direct seeding of trees.
U. S. Dept. Agr. Yearbook 1949: 136-146, illus.

Rettle, James C., Banks, Wayne G., and Doverspike, George E.

1949. Preliminary survey of the marketing of farm woodland products in the northern New England States. Northeast. Forest Expt. Sta. Paper 25. 28 pp., illus. (Processed.) Upper Darby.

Rettie, James C., and Simmons, Fred C.
1949. Estimates of bark supply in the Northeast.
Paper Trade Jour. 128 (15): 21-23, illus.

Schreiner, Ernst J.
1949. Poplars can be bred to order.
U. S. Dept. Agr. Yearbook 1949: 153-157, illus.

1949. Amateur tree breeders? Why not?
U. S. Dept. Agr. Yearbook 1949: 158-159.

Simmons, Fred C.
1949. Since the days of Leif Ericson.
U. S. Dept. Agr. Yearbook 1949: 687-694, illus.

1949. Northeastern logging practices.
In Harvesting timber crops, by A. E. Wackerman. 437 pp.,
illus. New York.

1949. Harvesting the forest crop in the Northeast and the Lake States.
In Improvements in logging techniques in the United States, by
George L. Drake, Fred C. Simmons, M. H. Collet, and E. E. Watson.
(pp. 5-14, illus., processed.) United Nations Sci. Conf. Lake
Success, N. Y.

1949. What's new in sawmilling?
South. Lumberman 179 (2242): 64-74, illus.

1949. Sawmill trends. (Part 1.)
Wood 4 (8): 27-28, 45, illus.

1949. Sawmill trends. (Part 2.)
Wood 4 (9): 26, 48-50, illus.

Trimble, G. R., Jr., and Tripp, Norman R.
1949. Some effects of fire and cutting on forest soils in the lodgepole
pine forests of the northern Rocky Mountains. Jour. Forestry
47: 640-642.

Williams, Ellis T.
1949. Forest insurance.
Northeast. Forest Expt. Sta. Paper 26. 85 pp. (Processed.)
Upper Darby.

Submitted For Publication During Quarter

Rettie, James C., and Ineson, Frank A.

The Otsego Forest Products Cooperative Association of
Cooperstown, N. Y.: an evaluation. U. S. Dept. Agr. Misc. Pub.

Simmons, Fred C.

What is new in sawmilling.
Canada Lumberman

Wright, Jonathan W.

Holly hybridizing techniques.
Amer. Holly Soc. Proc.

Ready For Processing By Station

Banks, Wayne G., and Rettie, James C.

Restocking conditions on the burned-over forest lands of
southwestern Maine, June 1949. (Station Paper).

Harper, V. L., and Rettie, James C.

The wood-supply situation in New York State with special
reference to wood for pulping. (Station Paper).

Little, S., and Somes, H. A.

Slash disposal in pine-oak stands of southern New Jersey.
(Station Paper).

Ecology and silviculture of whitecedar and associated hardwoods
in southern New Jersey. (Ms. retyped 191 pp.)

In Process Of Or Awaiting Editing

Hough, A. F.

The forestry program of the Otsego Forest Products Cooperative
Association, 1937-48.

Somes, H. A., and Moorhead, G. R.

Mortality, basal scarring, and growth of prescribed-burned
oak-pine stands of southern New Jersey. (Station Paper).

Being Reviewed

Barraclough, Solon, and Rettie, James C.

Ownership status of small private forest-land holdings in 23
New England towns.

Dill, H. W., Jr.

A method for using aerial photos in land-use inventory.

Forest Survey

Forest statistics for southern Vermont.

Forest statistics for northern Vermont.

Hale, Charles E., and Trimble, G. R., Jr.

Permanent wilting percentages of some glacial soils
in the Upper Susquehanna watershed.

Hough, A. F.

Persistence of eastern hemlock and American beech in a virgin
forest on the Allegheny Plateau.

Reforestation of old burns may be aided by chemical control
of herbaceous and shrubby growth.

Husch, Bertram.

Fuelwood consumption in New Hampshire.

Wright, Jonathan W.

Pollen dispersion of some forest trees.

Summary of tree-breeding research at the Morris Arboretum,
1947-48. (Station Paper).

Returned To Author For Revision

Bevan, Arthur, Varney, G. L., Gedney, Donald R., and Whelan, Donald
Flash floods and landslides in the Potomac River watershed,
June 16-18, 1949. (Special Report.)

Camp, H. W., and Bickford, C. A.

Use of binoculars with mil scale as a training aid for
estimating form class. (Station Note.)

Flood Control Survey

A bibliography on frost.
(Station Paper)

Little, S., Allen, J. P., and Somes, H. A.

More on the costs and conditions in prescribed burning.

-----, and Moore, E. B.

Effect of prescribed burns and logging on the reproduction of
shortleaf and pitch pine.

-----, and -----

Mechanical preparation of seedbeds in converting oak-pine stands
to pine.

McQuilkin, W. E.

Tests of preservatives for cloth nursery-bed covers.

Simmons, Fred C.

Integrated logging.

(Station Paper.)

Westveld, M.

Elements of crop security.

QUARTERLY REPORT -- ADMINISTRATIVE SERVICES

JULY-SEPTEMBER 1949

by G. A. Cashion and R. M. Kendall

TRAINING

Ralph Atkinson, Statistical Clerk at the Adirondack Research Center, was detailed to Upper Darby for approximately three weeks of training in the Administrative Services Section.

PERSONNEL REASSIGNMENTS

Ralph Atkinson later accepted a transfer to the Monongahela National Forest as Chief Clerk. Robert Jennings is expected to replace Ralph at Paul Smiths.

Helen Geniszewskz has accepted a transfer to the Division of Operation, Region 7.

INSPECTION

Fiscal and safety inspections completed during this quarter were as follows:

7/5, 6/49	Cashion--Allegheny Plateau
9/12-13/49	Cashion--White Pine
9/14-15/49	Cashion--Penobscot

QUARTERLY REPORT -- MENSURATION AND BIOMETRY

JULY-SEPTEMBER 1949

By C. A. Bickford

SURVEY DESIGN

The problem of survey design has been critically reviewed and analyzed in view of the proposed revision of accuracy standards from $2\frac{1}{2}\%$ of cubic foot volume on 15 million acres to 3% per billion cubic feet. Experience from completed units indicates the new standard may require twice as much field work as we have been doing. The resultant delay in completing the inventory phase of the survey would be serious.

When forest survey activity was resumed after the war, a three step sampling design was developed, based on aerial photographs, as follows:

- (1) Forest-nonforest determination of a large number of samples on the photographs.
- (2) Examination under stereoscope of a portion of the forest samples to stratify forested area by classes of volume per acre.
- (3) Field examination of a portion of the plots of step (2) to obtain volume and sample tree data.

This three step design was recommended nationally for the initial inventory phase but when the work was undertaken here, a slight modification was introduced. Roy Chapman's formulae of optimum allocation were followed to arrive at planned numbers of field and forest "stereo" plots. This latter number was divided by proportion forested to arrive at number of plots to put on the photograph. This procedure results in a two, rather than three, step design under which nonforest is just another class.

This difference in design was suspected as being responsible, in part, for the greater proportionate increase in required data to meet the new standards. Development of the algebra of sampling design revealed that, for the same amount of money, the theoretical sampling error was smaller for the three step procedure if there was any nonforest. Further analysis brought out the fact that the difference was small and unimportant where proportion forested was greater than about $2/3$ but that this difference increased sharply as proportion forested diminished below about $1/2$ and that if proportion forested is less than $1/5$, a four step design may be better than three steps.

This analysis of design is not yet complete, but it seems probable that in new units where proportion forested is less than $1/2$, the three step design will be used.

GROWTH OF YELLOW POPLAR

A plan of analysis for this study was worked out with Carl Holcomb. The philosophy of this plan is discussed below to illustrate the kind of thinking that should precede the discussion of "methods" (step 4, page 7 in Harper's memorandum of April 8, 1947) in preparing working plans.

It is proposed to test increment core data for the significance of the effects of dbh, vigor, and past growth on radial growth. Significant relations of growth as affected by dbh have been reported repeatedly wherein average growth is shown to increase with average dbh even though individual trees seem to grow at a continually diminishing rate.

Of the three factors named above it is evident that vigor is independent of dbh and past growth. The first step therefore was to sort growth by vigor class, compute class means, and test the mean differences for significance. This has been done and vigor found to have a highly significant effect on radial growth of yellow poplar.

Of the two remaining factors, it seems more reasonable that dbh should depend on past growth than vice versa. The data by vigor classes were accordingly sorted by past growth and tested for linearity of regression. As deviations were not significant for vigor 1 trees, a straight line was fitted to the data by least squares. Similar tests will be made for the other vigor classes and equations fitted.

To examine the data for the influence of dbh, residuals will be computed from the difference between actual and estimated growth and an analysis of variance made to find out if dbh has had a significant effect. If not, we are not concerned with dbh as a factor affecting growth. If so, is the relation linear? If so an equation will be fitted. If not, a transformation will be sought that straightens out the relation.

PLOTTING DATA

The choice between dependent and independent variable may be bothersome and may even seem to be of no real consequence. Certainly when we plot values that satisfy $y = 2X - 10$ it does not matter which we use for our axes or whether we go from Y to X or X to Y.

With observed data the situation is different, however. If we measure diameter and height of 100 trees and plot these measured values on ordinary cross section paper, we may expect a mass of dots in the area of middle diameters and middle heights with only scattered dots for large and small diameters, or heights. With these data, a positive trend may be evident from the dots alone.

Often the scatter of individual observations of empirical data is so great that no trend is evident and in seeking to establish some trend, we sort the data by dbh, compute average height, and plot these averages of height by dbh class. In this illustration, dbh is the independent variable--the basis of the sort--and height is the dependent variable. When such data are plotted it is WRONG to read off a diameter

for a given height as it amounts to an average diameter for trees of that height and the data were not so treated. This is called a "reversal of variables" and is to be abhorred like the plague.

Another problem arises in the choice of independent variables. Insofar as we are wise enough to do so, independent variables should be causative factors while dependent variables should be resultant factors. It is not always possible--or necessary--to distinguish cause from effect, as in diameter and height above, but useful relations may be established if these relations are not abused.

For more complete treatment, read "Some possible errors in the use of curves" J.A.R. 31:923-928 (1925) by Donald Bruce.

QUARTERLY REPORT -- FOREST MANAGEMENT

JULY-SEPTEMBER 1949

By I. H. Sims

Major recurrent activities of the Division during the quarter were: preparation of the Project Status Sheets for the uniform project system, participation in the inspections of the Delaware Basin and Mountain State Work Centers, and attendance at the Station Advisory Council meeting at Jacksons Mill, West Virginia.

Non-recurrent activities received more attention and effort, however. Compartment study working plans for the Pocono and Fernow Experimental Forests were reviewed and assistance was given the two centers on revisions. Guides and instructions for the keeping of compartment records at all experimental forests were prepared and sent to the centers for trial in actual application. Cooperative agreements for the financing of experimental logging on compartments of the Massabesic and Fernow Experimental Forests were processed through the required revisions and clearances. A vast collection of maps pertaining, more or less, to the centers and experimental forests was sorted, indexed, and filed in a new set of map drawers where they can be found. Two days were spent in the Anthracite territory with Mr. James MacDonald of the British Forest Service, and a field schedule was arranged for Sr. Tomas Clark of Chile. Ten-year programs of road construction needed for the compartment studies on the Massabesic and Fernow Experimental Forests were prepared for submission to Washington from information furnished by the centers. And another job, which we hope will never recur, was investigation of the disastrous fire of July 29, 1949 at Beltsville.

Dr. E. J. Schreiner joined the Division staff in Upper Darby on July 1 to direct Genetics work for the Station as a whole. During the quarter he inspected hybrid poplar plantings on the Massabesic, Hopkins, and Beltsville Experimental Forests in addition to visiting the original Oxford Paper Co. hybrid poplar plantation at Rumford, Maine. He is now settled in the room Bickford formerly occupied at Upper Darby. Ernie shared with Harold Ford the tragedy of losing practically all his furniture in the Beltsville fire. The furniture was stored temporarily in the exhibit shop which burned completely.

Sims was confined to the office for five weeks during July and August as Acting Director while Dr. Harper, Rettie, and Banks were on a special assignment for the Washington Office. Ash Hough spent the quarter at Kane on plot remeasurements and some special studies on cherry regeneration. Except for a brief vacation Ken Clark was in the office.

QUARTERLY REPORT -- FOREST ECONOMICS

JULY-SEPTEMBER 1949

by J. C. Rettie

FOREST SURVEY

A peak of activity in the field was reached on the Forest Survey during this quarter. Through the employment of six student field assistants, and cooperation of the State of Maryland, five field crews were maintained in New York State, one crew in Pennsylvania, one crew in West Virginia, and two crews in Maryland most of the quarter. This force completed the field inventory for West Virginia, and the surveys of consumption of fuelwood, fence posts, and miscellaneous farm wood products in West Virginia and Vermont. The forest survey was initiated in Pennsylvania and Maryland, and considerable progress was made on field plot work in New York.

Aerial Photography

Aerial photographic operations were active in New York, Maryland, and Pennsylvania. Photography is nearly completed for the first two states. Poor photographic weather has caused this activity to lag behind schedule, but we are hopeful that conditions will be more favorable during September and October and that the lag will be overcome.

Inventory

The final field plot for West Virginia was completed by Fred Hampf and Tom Ginn early in July. Also during July, field work was initiated in the western panhandle of Maryland, and southeastern Pennsylvania. Latest reports from the field indicate that field plot work has been completed in Garrett, Allegany, and Washington Counties of Maryland plus some photo interpretation for Harford and Carroll Counties. Cumberland and York Counties have been completed in Pennsylvania.

Field work in New York was concentrated in the northern portion of the state and in the Adirondacks. Approximately 6 million acres or about 45 percent of the forest area of the state has been sampled to date. Ordinarily forest type mapping is kept current with the field inventory. It has, however, been deferred somewhat this past summer in order that as much of the inventory work in the Adirondacks as possible could be completed before winter conditions make field work difficult. About 34 percent of the gross area of the state has been mapped.

Growth and Drain

Surveys of the consumption of fuelwood, fence posts and miscellaneous farm wood products were completed in the field for West Virginia and Vermont. Analysis of these data has not yet been started.

Compilations

Tabulations of forest area and timber volume were completed for the two units in Vermont. The tables for southern and northern Vermont have been compiled by watersheds instead of by counties. Data are being compiled by counties for the State statistical report.

Stand and stock tables have been compiled for all of Vermont for each forest-type group and stand-size. These will be used for estimates of growth for the State report.

Tabulations have been started for the next Forest Survey release, the Potomac Section of West Virginia.

Reports

Two Forest Survey releases have been distributed, No. 6, "Forest Statistics for the Monongahela Section, West Virginia" and No. 7, "Forest Statistics for Southeastern West Virginia". The next release, No. 8, "Forest Statistics for the Cumberland Mountains Section, West Virginia" is being processed.

The two survey releases (Nos. 9 and 10) Southern Vermont and Northern Vermont, are being reviewed prior to processing.

Inspections and Visitors

During this quarter we received a thorough going over by two inspectors from the Washington Office. Roy Chapman, with Al Bickford, made thorough analyses of our sampling techniques and methods of determining sampling errors. Chapman also acquainted himself with the computational procedures used in arriving at final forest area and timber volume figures. Final results of these analyses are not now available, but we are anticipating some minor changes in our sampling intensities.

Ray Garver spent ten days with Station personnel, both in Upper Darby and in northern New York, delving into all phases of forest survey work in the Northeast. We have not yet received Mr. Garver's report, but many helpful suggestions were made by him, and satisfaction was expressed as to progress being made on the survey.

Three foreign visitors were given a brief look at the Forest Survey during this quarter. D. A. N. Cromer of the Forest and Timber Bureau of the Australian Forest Service spent two days in Upper Darby discussing forest survey techniques. His greatest interest involved the use of aerial photos for mapping and sampling purposes. Dr. Yrjo Ilvessalo, in charge of Forest Survey, Finland Forest Service, spent two days with a Forest Survey crew in western Maryland studying the field phase of the survey. Mr. Rene Jolain, Inspecteur General Des Eaux et Forêts, French Forest Service, spent one day in the field near Saranac Lake, New York, with Dick Colgan, and one day at Upper Darby with Mr. Ineson.

Plans for the next Quarter

1. The survey of woods waste and tree data measurements will be completed for New York.
2. Field inventory work will be continued in New York, Pennsylvania, and Maryland.
3. Additional tabulations of game-habitat survey data for the Conservation Commission of West Virginia will be completed.
4. Forest Survey releases to be issued:

Cumberland Mountains Section, West Virginia
Southern Vermont
Northern Vermont
New Hampshire State

5. Forest Survey releases to be prepared:

Potomac Section, West Virginia
Delaware, Otsego, and Schoharie Counties, New York
Foothills Section, West Virginia
Little Kanawha - Elk Hills Section, West Virginia

PRICES AND MARKETS

Marketing and Prices of Farm Woodland Products

Two reports on this project were released. They were Station Paper No. 25, "Preliminary Survey of the Marketing of Farm Forest Products in Northern New England", and Station Paper No. 27, "Preliminary Survey of Markets and Prices of Forest Products in the Del-Mar-Va Peninsula".

Arrangements have been completed to begin a marketing and price survey in cooperation with the Extension Forester of Rhode Island. The project will include all of the State of Rhode Island. It will provide: (1) A complete list of all available buyers of forest products, showing address of and products bought by each; (2) Species and quality specifications for each class of product; and (3) General price information. This information will be incorporated into a marketing bulletin for the State of Rhode Island. Field work on this project has begun.

Preparations for holding test-demonstrations of the hardwood log grading system developed by the FPL are going forward. A preliminary "Guide for Test of Hardwood Log Graders" has been prepared. Both Region 7 and the Pennsylvania Department of Forests and Waters are cooperating in making arrangements and aiding in the tests with owners of hardwood sawmills who are interested in testing out the log grading system. It is expected that one or more test-demonstrations will be staged during the coming quarter year.

FOREST ECONOMICS INVESTIGATIONS

The Wood-Supply Situation in Certain New England and North Atlantic States

The paper "The Wood-Supply Situation in New York State with Special Reference to Wood for Pulping" by Harper and Rettie was revised to include 1947 data.

Some work was done in gathering similar data for Maine, New Hampshire Vermont, and Pennsylvania, with a view to preparing a report on each of these states.

Rehabilitation on Fire-Damaged Lands in Southwestern Maine

Following review and comments by various individuals, the station paper reporting on field survey of the burned area in southwestern Maine was reviewed to incorporate certain suggestions. Final draft is being typed and processing should start in the near future, as soon as desired distribution is determined.

QUARTERLY REPORT -- FLOOD CONTROL SURVEYS

JULY-SEPTEMBER 1949

by G. L. Varney

GENERAL

Most of the staff have been busy with field examination of the Upper Susquehanna watershed during the quarter. Considerable progress has been made in the preparation of reports on special studies and we hope to get many of them out of the way in the early part of the next quarter. Reductions in funds resulted in the transfer of two technical men to the Pacific Northwest and the transfer of 50 percent of our clerical help to other Divisions in the Station. The Section of Advance Studies has been eliminated. Necessary special studies will be assigned to other sections.

Surveys and Preliminary Examination Reports

Field work on the Upper Susquehanna watershed has been pushed during the quarter and should be completed by the end of October. Incomplete aerial photo coverage in Tioga and Chemung counties has delayed some of the inventory work in these counties. Necessary photographs have recently been made available through cooperation with P.M.A.

The status of the Connecticut survey report is unchanged except for minor revisions. A conference with Vermont is expected in late October or early November. Following this the report will be revised and transmitted to Washington. The U.S.G.S. and Army Engineers raised a question on the computation of flood water storage on the Farmington River. A copy of our computations has been forwarded to the Boston office of U.S.G.S., for checking and comments.

Office work on the Merrimack report is practically completed. A proposed plan of U.S.D.A. cooperation in small dams on this watershed was forwarded to the New Hampshire Water Resources Board for their comments. Office work in damage appraisals, runoff computations, and program development continues on the Allegheny. Office work has not started on the Monongahela survey report.

Cooperation with Soil Conservation Service

Bevan, Varney, Whelan, and Cavallero met with SCS, Upper Darby personnel and Messrs. Dumm, Ogroskey and Musgrave of Washington, to discuss the overall approach to hydrologic problems of flood control surveys. No final decisions were made. The S.C.S. has decided to combine the Lehigh watershed report with that of the Delaware. The Lehigh will be used as a sample subwatershed and there will be no further work on the Lehigh report. Field work is in progress on the Delaware with two men from this office assigned to the woodland phases. There has been no action on the Youghiogheny and Roanoke reports.

Personnel

Richard Sartz and Charles Hale of the Division are transferred to the Flood Control Survey Division of the Pacific Northwest Station at Portland, Oregon, effective October 2.

John Zerbe has been assigned to the Soil Conservation Service assisting Ted Flint on the woodland phases of the Delaware River Survey.

Marguerite Trautz and Betty Henning were transferred from Flood Control Surveys to Forest Economics and Forest Survey.

OTHER ACTIVITIES

A report on the flash floods and slides in the Potomac watershed has been completed and is being reviewed by Station personnel prior to submission to Washington. Some of the findings of the report are:

- (1) The storm of June 17-18 was of a magnitude seldom reached by storms in that area and that precipitation intensities were in excess of any known surface infiltration rates attainable under the forest types of that area.
- (2) The 20 to 30 years of protection and management under National Forest administration has visibly improved humus distribution and depth over the forested portion of the watershed resulting in higher infiltration rates and increased soil moisture storage.
- (3) The actual area affected by slide action is relatively small but enormous quantities of soil and rock are poised on these areas and will move down into lower stream channels during future storms. An extensive rehabilitation job is indicated if bottom land investments in roads, bridges, and channel improvements are to be protected.

A proposed station paper on "The Permanent Wilting Point of Some of the Soils of the Upper Susquehanna Watershed", was prepared by the division.

Field work was completed and report preparation started on a "Tentative Study of Spoil Bank Revegetation in West Virginia" by members of the division, in cooperation with the Mountain State Branch.

A report on the "Determination of Soil Moisture Relations in a Flood Control Survey as Affected by Conditions of Soil and Cover" was reviewed by Station personnel and is being put in shape for publication.

A report was prepared for the Chief's office describing the method of land use inventory used on the Allegheny watershed. This included the analysis of the results by statistical methods and a statement of the adjustments in procedure to be followed on future surveys.

Trimble participated in a general meeting of forest soils men at the Pack Forest, Warrensburg, New York, on September 7-8. A new classification was adopted by the group.

Frost studies will be continued at the Delaware Branch Station although on a limited basis. Steps are also being taken to interest a graduate student in carrying out controlled freezing studies in the laboratory.

The Division is cooperating with Forest Surveys in a study of large scale strip aerial photographs. Flights of the Beltsville and Pocono Experimental Forests by commercial flying services will provide strip photos at 5 scales. Color and panchromatic film will be used and flights made under summer and winter conditions.

Larry Queal of the Watershed Appraisal section spent a week accompanying a Departmental exhibit at the New York State Fair.

QUARTERLY REPORT

FOREST UTILIZATION SERVICE

July 1 - September 30, 1949

TIMBER CONVERSION

Beech Series

Beech logs for veneering, gluing, and seasoning tests and squares for bending tests were delivered by the New York State Conservation Department, Pennsylvania Department of Forests and Waters, and Consulting Forester, Allan Bratton to several agencies working on the Beech Series. The various authors appear to be proceeding satisfactorily on the 24 papers in the series.

Logging on Experimental Forests

Mr. George Kramer, Training Officer, Region 7, Mr. Sims, Chief, Division of Forest Management, and Mr. Simmons have prepared plans for a two-week training school to be held at Parsons, W. Va. in November for those branch station personnel who will be directly engaged in logging operations. The school will include instruction in all phases of logging, but particular emphasis will be placed on safety and cost control.

Woodsmen's Field Day

The Woodsmen's Field Day held at the historic logging town of Tupper Lake, N. Y. in July under the auspices of the Woodsmen's Club of Old Forge, N. Y. attracted a crowd of over 3,000 people. Mr. Simmons and the Station's Adirondack Branch cooperated with representatives of many Adirondack wood using industries and logging operators and the The State Conservation Department in arranging and carrying out this successful event.

The event included a parade in which rode well known "old-timers" in the lumber industry. Also included were logging equipment floats, prize teams, and large loads of logs and wood. A series of contests of felling accuracy, log bucking with bow, crosscut and light and heavy power saws, chopping, and the horse pulling was a popular feature. Among the records made, several contestants in the power saw bucking contests succeeded in overflowing a 1/2 cord measure in the five minute time allowed.

There was also a display of harvesting equipment of all kinds provided by 20 manufacturers. The current models of 10 manufacturers of power chain saws were shown. These included the new little 60 pound I. E. L. twin cylinder gasoline saw, manufactured by Industrial Engineering Laboratories at Vancouver, B. C., the gasoline powered one-man saws put out by Homelite Corporation at Port Chester, N. Y. and that of the Lombard Governor Co., of Ashland, Mass. The saws were demonstrated by cutting and ripping dry beech logs. An interesting item was the imported English Warsop gasoline powered portable rock drill now priced at approximately \$650.

New Automatic Slab Saw

A new device, developed by T. W. Hardes of the lumber company bearing his name near Bradford, Pa., for automatically cutting sawmill slabs into fuel-wood lengths, was observed in action. The present model is very similar to the machine developed by Flake Duncan of Bel Aire, Md. from which it was adapted. The slabs are tossed onto a link belt conveyor chain. At predetermined intervals, from 12 to 24 inches, the belt stops, a hold-down presses the load of slabs tight, and a swing saw cuts them off. At present all movements in the machine are made by mechanical means, but Mr. Hardes is developing a similar tool that will use hydraulics to actuate the hold-down and swing the saw.

Wood Waste

Briquetting Machine

The sawdust briquetting machine developed by Mr. Walter Letts, Northfield, N. Y. is now available on order. The raw material is now satisfactorily dried by a series of cyclones and blowers. Mr. Letts has not proceeded further in the marketing of the "Burnetts", which are extruded round briquettes about 2 inches long. He will, however, sell an entire installation including a diesel motor, hammer mill, briquetting machine, and the drying equipment for about \$25,000. Reportedly this machine can handle 18 tons of dried softwood sawdust per day.

Log Grades

In the important field of log grade promotion, considerable work was done. To check available instructions, particularly occurrence and degrading effect of log defects, Mr. Lockard and Mr. Simmons of FUS and Doverspike of Forest Economics visited six mills in Northwestern Pa. in July. Only two problems presented themselves. One was the evaluation of certain log abnormalities found in beech, and the other, the evaluation of epithelial growth on young red oaks. In the former case, it appears that bark features in beech which definitely cannot be related to cause can be treated conservatively; epithelial growth in red oak can be handled satisfactorily under existing instructions.

An inspection was also made of a National Forest timber sale where cherry was being cut. Appearance of trees of the sizes and ages being cut is somewhat deceptive due perhaps to flaky bark which conceals overgrowths caused by knots and adventitious growth. However, these important degraders can readily be found if they are systematically searched for so there should be no trouble in grading this species.

Effectively to promote the use of the grades, it appears that demonstration tests are desirable. Accordingly FUS wrote up a plan for making such tests. The Regional Office, interested in possible uses of log grades in their timber appraisal procedure, sent a circular to the National Forests asking that the possibilities of cooperation be explored. As a result, one mill in New Hampshire, four in West Virginia, and three in Kentucky expressed a desire to cooperate in such tests. In addition, the Farm Foresters in Northwest Pennsylvania have arranged for a test at a mill near Clarion, Pa., for early in October. The main obstacle to securing cooperation is the lack of competent lumber graders which, according to the plan, are to be supplied

by the mill. Our observation is that there is considerable interest in possibilities of log grading on the part of mill men.

Mr. Lockard gave Farm Foresters from Pennsylvania, West Virginia, Delaware, Maryland, New Jersey, and Virginia, assembled at a yearly meeting at Green Bay, Va. an introductory course in log grading. Discussions included the whole subject of forest raw material grading, identification and classification of log defects, and explanation of FPL factory grades. As part of the program, foresters were required to estimate the contents of six trees. These trees were later felled, bucked into logs, and the logs were sawed at a local mill. Mr. Lockard graded the logs in the trees and estimated the value of the lumber. He also graded the logs and re-estimated the lumber contents. The lumber from the logs was tallied by grade by Virginia Forest Service technicians. Twenty-one logs of 4 species and 3 grades were involved so that not too much significance could be attached to the species-grade results because of the small sample. However, the following totals showed interesting relationships:

	<u>Number of Logs</u>	<u>Green Lumber</u>	<u>Lumber Value Per M.</u>	
		<u>Tally</u>	<u>Estimated</u>	<u>Actual</u>
Grade 1	4	428	\$84	\$93
Grade 2	12	750	70	73
Grade 3	5	153	44	51
Total	21	1331		
Average			72	78

Wyssen Cableway

By early summer, there were two installations in America of the Wyssen Cableway system (for description see FPL Mimeo 1637-27). One was on a sawlog operation in eastern Canada, the other on a pulpwood operation in the Adirondacks. The latter got into operation about the middle of August. Mr. Trayer, Mr. Harper, and Northeastern FUS staff visited this installation in September and found that the equipment was just being reinstalled in the second set-up. About 2,000 feet of haul cable reached from a road to a high rocky steep knob which was inaccessible to horses and tractors. From the first set about 250 cords of pulpwood in log lengths was removed. The change from the first to the second setting was made in about two days. As a result of the operation to date, the company believes that the equipment can operate successfully. Costs, however, are not low. They are no more than those for tractor skidding where this is feasible. Once installed there appeared to be no operational difficulty. The main worry was to get efficient set switching, since there are available in the East no skilled riggers. From the first set it was possible to make about 50 trips a day using a 5-man crew. The maximum load was about 4000 pounds or approximately one cord of spruce. No information was obtained from the operations to date on the point of damage to a residual stand because the mountain timber was clear cut. However, there is no damage in the lower area covered by the main cable, since the logs are suspended and only a narrow--about 10 foot--way must be brushed under the cable.

Integrated Utilization

Mr. Trayer and Northeastern FUS visited the Gunter Lumber Co. at Steep Falls, Me. where there is a very interesting operation. Twenty-five years ago in that section there was much more and better timber than there is today.

Then, little white pine was put into finish lumber; most being cut for match blocks and box boards of relatively low value. Local yards sold practically all Western softwoods. In 1928 production of match blocks was discontinued because of low grade lumber recovery from remaining stands. Today the Gunter Lumber Co. converts the remnants of the timber into high value items. Eight-foot logs, only, are cut; this leads to standardized production and greatly increases the yield and quality which can be cut from crooked trees. Most of the lumber is cut on small portable mills and kiln dried successfully at the main plant. After kiln drying, the stock is sorted: that suitable for knotty pine paneling is removed and immediately milled for this high-priced item. The remainder is sorted into two classes. One for wide exterior finish of rustic nature and the other, the poorest, for edge-gluing in a Linderman machine to make standard sized wide panels suitable for a variety of purposes. At the time of the visit this stock was being prepared for shelving to be put into the famous Levitt houses being erected in Westchester County, N. Y. Northeastern FUS has advised in the development of this plant, and helped it with its drying and milling problems.

Not only does this Company achieve an economic return from low grade material through proper integration of manufacturing and marketing, but through connections with the linoleum company they have achieved almost complete utilization. Erected within blower distance is a wood flour plant to which sawdust and shavings are blown directly. Edgings are put into loose bundles and transported by truck to the flour mill where they are hogged and also used for flour. The end trim is sorted and better pieces are saved out for a developing operation in linoleum crates and fruit boxes. This wood flour plant has capacity greater than the waste production of the Gunter Lumber Co. and consequently hauls in sawdust and shavings from other mills. It has a fleet of large specially built trailers used for this purpose. These have openings in the top so that they can be loaded at the production mills from bins. The material is removed from the trailers by suction. Incidentally the cost of this wood flour plant was about \$200,000 which is equal to or more than the investment in the primary plant.

Wood Chips

There is a growing interest in the use of wood as a soil conditioner. Much of the interest is centered in Rhode Island. Mr. Trayer and Northeastern FUS made a visit to various projects in this area. One is the use of the Fitchburg portable chipper in disposing of brush in areas of high hazard. This process has been continued for several years by the Providence, R. I. Water Board which is in the process of thinning its coniferous plantations. Feltwood is sold and the remaining tops are run through a chipper. The chips are blown on the ground. It is claimed that brush disposal by this means costs only about half of the cost of burning. No experiments are underway to determine the added value of this material as a forest soil conditioner. However, at Rhode Island State College, R. I., experiments are underway to determine the rate of decomposition of wood chips. Hardwood and softwood chips are applied at the rate of 10 pounds per acre to the top 7 inches of soil in a series of containers. Recurrent chemical analysis of the soil condition is made. The main object of this test is to show whether or not chips actually "sour" the soil as popularly supposed and determine the rate at which they decompose. At the Experimental Farm

of Rhode Island State College, mulching experiments using wood have been underway for several years. In blueberry culture, yield was increased by nearly 100 percent by keeping the area covered with a mulch of about 7 inches of sawdust. Other experiments indicated that both sawdust and pine wood chips were suitable for strawberry growing. General experience to date indicates that wood mulching is very effective in all fruit growing. The rates of application here are very high, running up to 300 tons per acre. With small plants, reduction in cost of weeding may cover the cost of mulching in 2 or 3 years. However, as yet none of the experiments are particularly directed at determining costs and returns.

Northeastern FUS is keeping closely in touch with developments in these uses of sawdust and chips throughout its territory, and actively helping in wood procurement and chipping techniques.

West Virginia Portable Mill

A portable mill developed by the Forestry Department of the University of West Virginia was demonstrated at the Northeastern Station Council Meeting held at Jackson Mills, W. Va., early in September. The mill is carried on one trailer drawn by a truck tractor on which is mounted the power unit. The outfit is short-coupled so that it can make the sharp turns common to West Virginia roads. Unfortunately, however, the design has not resulted in a mill which would meet highway width specifications, so that it still is necessary to get special permission to move. The mill is a sturdy job and has provision for positively aligning the ends of the ways which are detachable. Although easily transportable, as now designed, a rather long period of time is required for setting up, about 2 days being the minimum indicated. However, once set the mill does a good job. It is operated by the West Virginia Forest Products Association for a local Soil Conservation District and does custom sawing only, cutting material cheaply for the home use of farmers who have done their own logging. In Rhode Island, a Jackson Harvester is used in a similar set-up. Northeastern FUS helped in the design of this mill.

WOOD CHEMISTRY

Charcoal Survey

In September, E. W. Beglinger of the FPL and Mr. Simmons made a survey of the charcoal manufacturing industry of the Northeast. More than twenty typical charcoal producers, ranging all the way from the one remaining 60 cord-a-day direct recovery plant in Pennsylvania to a little one-cord cinder block kiln operated by an upper New York State farmer, were visited.

The general conclusion was that the charcoal market in the Northeast is excellent, with prices at an adequate level, and demand generally in excess of supply. However, it was almost impossible to collect specific information on the proportion of the market made up by the various end uses for the material. Best opinion is that about 1/2 the demand is for heating and cooking, including railroad dining car service; and 1/2 for various industrial uses. Most producers claimed they did not know much about the latter, since they sell to wholesalers. A thorough investigation of markets is urgently needed.

The market for charcoal by-products, however, is practically non-existent. Calcium acetate can be sold abroad only, and there is only a slight domestic demand for sodium acetate. Prices for methanol and glacial acetic acid are at an unprofitable level due to competition from low priced synthetics. Consequently, only four recovery plants are running in their entirety. Of the eight remaining recovery plants, two have been dismantled, two are idle, and four have been converted to burn all their gases instead of producing by-products. Two of these latter, which formerly burned bituminous coal, use wood gas as retort fuel and have cut out 5/6 of their coal bill. The two others, which use natural gas as fuel, are burning their wood gas, as a waste, in the open air.

Kiln producers are generally doing well and running to capacity. Several are carbonizing slabs, and one was carbonizing edgings. Since the market for charcoal fines, especially those containing bark, is poor there is much interest in small scale briquetting equipment. One kiln producer has developed his own briquetting machines with about 8 tons a day capacity. Two of these have been built and two more are being constructed. The market for briquettes was said to be excellent, and the price about \$25 a ton more than for lump charcoal. The recommendation was made that the Laboratory do some work on small scale briquetting methods. Especially troublesome is the development of some inexpensive way of baking and dehumidifying formed briquettes.

It was also recommended that the Laboratory study ways and means of improving the quality of charcoal produced in small kilns. Several complaints were heard that small kiln charcoal was smoky, and undesired even for domestic or dining car use. Improved schedules, with higher heats, would presumably reduce the percentage of volatiles in small kiln charcoal. Some redesign of existing types of kilns may be desirable. A very important need is a census of kiln operations. No one has any information on the number and location of these small producers, which are becoming an increasingly important factor in the charcoal production picture.

SEASONING

Practices generally used in air seasoning lumber have always been on the poor side, especially in small mills. Although little information is available on the actual economic losses incurred through such practices, they can be substantial. Recently, introduction of labor saving mechanical equipment such as the straddle truck and the lift truck came into wide use in lumber handling. To investigate the problems solved and the problems created by such devices is the objective of a new FPL project. As part of the problem analysis, Mr. Peck of the FPL and Mr. Lockard inspected operations at 23 plants in the Northeast known to be using such equipment. These plants ranged from small, semi-portable saw mills through larger plants, to concentration yards, handling both white pine and hardwoods.

It was found that use of this equipment has not tended to improve piling practice. At fabricating plants where green lumber is received and where operating conditions are ideal, practices approximating best hand piling are used at either a considerable saving in labor or else at the same cost with more sorts made possible. Where piling practice has been "sloppy" the use of machines appears to have made it even sloppier because of the ease at which a unit of lumber can be moved and dumped. However, observations indicate questions as to how important some of the generally accepted

current piling recommendations are, particularly those dealing with slope and pitch. The question of chimneys, and the spacing of boards within the piles, must also be scrutinized due to the fact that the units used in machine handling are generally small. There is also the tendency to concentrate the best piling practice on good grades. This is not a new idea but still there is question as to degree and significance of loss suffered in the lower grade, particularly at current price levels. Pile roofing is another moot question. Some good operators do not roof their piles but use low grade boards on the top two or three courses. White pine ordinarily is less carefully piled than hardwood species. Most operators claim little damage regardless of how the lumber is piled, but at least one large operator feels that there is a loss although he has no idea of the magnitude. The general impression was gained that the standard mechanical yard equipment can be so handled as to do any kind of piling desired. However, it is very easy to do a poor job because of the difficulties arising from lack of adequate arrangement, proper yard grading and road layout. This investigation will be expanded by the FPL to other Eastern regions in the near future.

PULP AND PAPER

Roofing Felt Survey

In the Northeast there are about 16 mills producing roofing felt. In the past the chief raw materials for these mills has been rag and waste paper with wood flour sometimes added. In recent years there has been a movement to use wood fiber produced on attrition mills as a substitute for rags. To determine how far this wood use had gone, the factors influencing its use, and to determine problems requiring research, Mr. Hrubesky of the FPL and Mr. Lockard visited 10 of these mills in August. At the present time, wood accounts for about 1/3 of the fibre used in this industry. In general, the mills would like to use wood fibre in preference to rags entirely because of the instability of the rag market in which prices fluctuate widely, both seasonally and over shorter periods. In fact, some mills have almost completely replaced rags, and others use smaller percentages than before. It is generally believed that a maximum amount of wood can be used in roofing felt and a minimum in flooring felt. One company uses no wood whatsoever in its flooring felt. Another, however, uses wood and paper exclusively for this product. This indicates a great deal of difference in technical know-how so far as wood is concerned. In roofing felt, the main requirements for felt are that it be strong enough to withstand the rather rigorous treatment in the saturating and coating machine, that it absorb a desirably high amount of asphalt. The strength requirements center on tensile strength and flexibility. Roofing felt demands a much greater absorbency than flooring felts but both require extreme flexibility. Defiberized wood has more than adequate absorptive powers but is apt to affect flexibility adversely. However, much of the difficulty with a high wood fiber content sheet might be overcome with machine design. One plant had made machine adjustments which lowered flex requirements. Another plant had an "easy" machine and was able to run a very weak sheet satisfactorily. Some of the difficulties with linoleum felt arise from the small size of core around which finished linoleum is wrapped. One opinion was that changes in this might help the situation. The whole problem of the use of wood is one involving the individual plants and the operating procedures more than technical considerations. However, any process which would improve the flexibility of

wood fibre would help the use of wood. Such a process must be cheap, however, or much of the economic advantage would be lost. Another point of difficulty lies in the presence of shives in the defibrated wood. The present defibrators do not break up all of the fibre bundles.

Tests by the Bureau of Standards indicate that these shives may be a cause of trouble in the finished roofing. They are also bad in linoleum. The material could be refined further but in so doing either the cost is raised or the absorbancy is reduced.

There appear to be no standard and acceptable tests for the various properties outside of tensile strength. Flexibility is measured in a number of ways in different plants, as is absorbtion. Tests for absorbency are probably in a more satisfactory state than are those for flex. The use of better test procedures might also aid in the movement to increase the use of wood. In a number of plants, question was raised as to the yields of fibre from wood. Some purchased by the cord and some by weight but all used the weight figure for accounting purposes. Yields vary considerably among plants using the same type of wood. On the other hand so far as we could determine, no plant had actually made tests which would show the yield of fibre from the several components of their stock.

There appeared to be no problem of wood procurement. Wood quality requirements are low, and all softwood species including pitch and Virginia pine as well as mixed hardwoods are used. Most of the mills purchased through their regular purchasing agent. One mill uses the organization of a pulp mill to procure its wood. Another mill procures the wood through an independent contractor who chips it at the plant site where it is purchased by the felt mill. Another mill has had a small field chipping installation but this has played only a small part in its operation due to the fact that there was no particular price advantage in the system. Wood is currently being delivered for about \$14 per cord containing about 2000 pounds, dry weight of wood.

Harvard Wallboard Conference.

Mr. Trayer and Northeastern FUS attended a Conference on Wallboard from Waste arranged by the Northeastern Wood Utilization Council held at Harvard University on September 16, 1949. A brief summary of the NEWUC manufacturing wood waste survey financed by the Federal Reserve Bank of Boston was given by Mr. Scwinski who was in charge of the field survey. As previously reported, this survey revealed 39 communities in New England in which more than 20 tons of wood waste are accumulating per day. A complete report on the survey will be published later.

A Massachusetts retailer gave a good paper on the problems of marketing which included the following requirements for a salable board: pleasing appearance, ease of handling, good nail holding power, adequate fire resistance, good insulating properties, high resistance to water and decay, possibility of joint concealment, ease of decoration, and last, but not least, reasonable price. Papers were presented by Mr. J. A. Asplund, inventor of the Asplund process and Donald F. Othmer of Brooklyn Polytechnic Institute on pulp preparation and production of wallboard without resin binders. P. W. Sears of Montesanto Chemical Co. gave the results of experimentation with resins used as a binder. There were discussions of a number of resin bonded boards including Plaswood, manufactured in

New Hampshire, and Wonderwood now manufactured in Europe. There was also a paper on equipment, particularly presses. Conclusions seem to be that there are now available many processes for making wallboards from waste. Many of these, both domestic and foreign, have similar characteristics, so the choice of process and equipment is almost one of personal preference. However, there appear to be no standard accepted criteria of quality or test methods for rating boards. The question of dimensional stability, although raised several times, was passed over rather lightly, in our opinion. The full text of the papers presented, together with a transcription of the discussion, will be published as a NEWUC bulletin.

GENERAL

United Nations Conference

Mr. Simmons participated in two of the sessions of the United Nations Conference in Conservation and Utilization of Natural Resources held at Lake Success in late August. At the first of these sessions, devoted to logging and sawmilling, he presented both of the introductory papers. The first of these was authored by George Drake of the Simpson Logging Co. of Shelton, Wash. with the collaboration of Elmer Matson of the Pacific Northwest Station, M. H. Collett of the West Virginia Paper Co., and Simmons. The second was his own introductory paper on "Sawmill Techniques". Both were followed by a number of experience papers by representatives of other countries attending. Fortunately there was considerable time available for discussion following these papers, which was well utilized. One interesting question was that of the representative from Burma, who wanted to know what equipment could be used in his country to replace elephants in logging. Two-thirds of the elephant herd, he said, had either been killed or escaped during the recent fighting. Simmons described cable and tractor skidding equipment that might be suitable, but emphasized that operation and maintenance of a fleet of tractors or donkey engines would be quite different than that for a herd of elephants.

The other session, devoted to wood preservation, pulping, and chemical utilization of wood unfortunately had a much more crowded schedule, with little time for discussion. Some very interesting developments in these fields were reported by the various participants. Dr. Stamm from the Laboratory presented the introductory paper on chemical utilization.

The results of this conference will appear in a printed "Proceedings" which will appear in several languages and be distributed throughout the world.

Publications

Publication of Mr. Simmons paper, "What's New In Sawmills", prepared for the Ninth Vermont Wood Products Conference, has brought in a flood of inquiries. Most of these have been for the names and addresses of manufacturers of various items of new equipment discussed and pictured. The New England "snagdragon" carriage for short log mills, the combination lumber stacker and carrier, and the "one man" hydraulic and mechanical mills were the devices most frequently asked about. There were also a number of questions on sawmill operation and layout. Wood, the Southern Lumberman, and the Canada Lumberman were the three journals that have

already published this paper. It will also appear in an early issue of the Timberman.

Mr. Lockard has prepared a mimeograph "Supplementary Information on Hardwood Log Grading" which is being used in the training and testing of these log grades in the field.

A third Station Paper in the series on the supervision of Northeastern logging operations, entitled "Integrated Logging" by Fred Simmons is now being multilithed, and will soon be ready for distribution.

Miscellaneous

The New York State College of Forestry in Syracuse has added to its extension staff a utilization specialist, Mr. James Owen. Members of Northeastern FUS conferred with him to aid him in getting oriented. His work will be initially largely with the furniture industry. He was interested in the possibility of promoting a dry kiln school and a gluing clinic. . . . Mr. Simmons and Mr. Lockard accompanied Mr. Trayer on an inspection trip through New England and New York State. . . . FUS attended the Northeastern Forest Experiment Station's Advisory Council meeting in Jackson's Mill, W. Va., September 8 and 9 and reported on its activities. . . . FUS was also represented at the Regional Office staff meeting on September 26. . . . FUS conferred with Professor Harry Rich of the Department of Forestry, University of Massachusetts, Dr. J. L. Keener of the Department of Animal Husbandry, University of New Hampshire regarding possible research projects in sawmilling and molasses testing respectively.

QUARTERLY REPORT -- HOPKINS MEMORIAL EXPERIMENTAL FOREST

JULY-SEPTEMBER 1949

By Frank E. Cunningham

HARDHACK CONVERSION STUDY (H-1)

Scheduled release work for this season was completed during the quarter. This consisted of cutting back competing vegetation which had developed since the planting in spring on one-half of each plot. Hedge shears proved to be the most useful tool for this purpose.

Growth measurements and survival counts were made and observational data on vigor, injury, and other factors were obtained for the first growing season. Preliminary summaries of the growth and survival data have been completed. Norway Spruce showed the highest survival, 93.8% of the four species used in this study while Red Oak exhibited the lowest, 84.8%. Red pine and European larch ranged between them in the order listed. Considering the fact that the Red Oak was established by direct seeding, the resulting germination and survival proved very satisfactory. As would be expected, the Red Oak showed the greatest height gain during the season with an average of 0.30 foot per tree. No appreciable difference in gain was noted between the three coniferous species. They averaged 0.09 foot per tree.

Apparently little difference existed between the three sites on which plantings were made. No appreciable difference developed in either survival or growth between them.

Of the three major site preparation treatments, bulldozing showed the highest survival and the lowest gain in height growth. Survival was lowest where no major site preparation treatment was employed. There seemed to be no appreciable difference in height growth between the burning treatment and no treatment.

In the minor treatments superimposed on the major treatments, little difference was noted between them as to height growth. However, survival was highest where harrowing was employed followed by scalping and no treatment, in that order.

While no final conclusions can be drawn from these first season's results, and none are contemplated, it is interesting to note that certain trends are developing, even at this early date. Highest survivals were obtained where no competing vegetation was present at the time of planting. Lowest height growth during the first season seems to be associated, probably because of the loss of nutritious top soil when scraping off the surface vegetation. Greatest height growth resulted when the top soil was left on the planting site.

When more detailed analysis of the data is completed, more information concerning the response of the various species used to the treatments employed will be available.

GENETICS

A large portion of this quarter was devoted to weeding and cultivating the hybrid poplar plantings described in the previous quarter's report. After employing several types of mechanical cultivation, it was still found necessary to hand weed the plantations. Golden rod, fern, sod and hardhack proved very difficult to eradicate, particularly close in to the planted tree. Mechanical methods, when used close enough to the tree to eliminate weeds, also uprooted the tree. The response in height growth to the weeding and cultivation was gratifying. The poplars seemed to jump into the air as though given a shot in the arm.

To avoid a replication of this past season's weed problem, it is recommended that consideration be given to developing adequate site preparation treatment prior to planting in the future. This could probably take the course of fall plowing and disking, followed by cover cropping. Plowing this cover crop under the following spring should do much to eliminate the weeds.

SMALL WOODLAND OWNERSHIP MANAGEMENT STUDY (H-2) AND CUTTING PRACTICE LEVEL PRACTICE PLOTS (H-3)

Little field work was done on these studies during the quarter. The market situation continues to be poor. Some contacts have been made and have proven unsatisfactory for our purposes. There is a possibility that a specialty market for chestnut posts may develop in the future. Since we have a fair amount of marketable chestnut, this possibility will be pursued further.

MAINTENANCE AND IMPROVEMENTS

A fire hazard reduction campaign in early September resulted in a decided rearrangement of materials and equipment in our buildings. Lacking adequate storage facilities for flammables, all flammable supplies such as paints, oils, greases, etc. were removed to a small building in the rear of the office. The equipment and supplies in the other buildings in active use were arranged according to function. Attics and overhead storage spaces were cleaned out and a considerable amount of debris eliminated.

Two of the staff rooms have been renovated and are now equipped with new furniture for the comfort and convenience of official visitors.

The porches, steps of the residence and the weather instrument shelter have received a new coat of paint.

MISCELLANEOUS

A start was made this season on organizing a nature study and basic forestry course to be given to the Girl Scouts and the Boys Club members who camp each summer on the forest. This will include lessons in the identification of local tree and shrub species, plantation establishment and care, and the care and management of natural reproduction adjacent to their campsites on the forest.

VISITORS

A small group of foresters visited the forest this fall to look over our red oak stands with a view of obtaining acorn collections from *Quercus borealis* and its variety, *maxima* to be used in a provenance test in this country, Denmark and Holland. They planned to cover the natural range of this species in their tour and arrange for seed collections at various locations throughout the range. This group included the following:

Assistant Professor Scott S. Pauley, Harvard Forest, Petersham, Mass.
A. G. Johnson, Arnold Arboretum, Boston, Mass.
P. Chr. Nielson, Arboretum, Hørsholm, Denmark
Helge Irgens Møller, Exchange Horticultural Student from Denmark

We arranged to provide this group with two bushel of acorns from this forest.

Other visitors during the quarter were:

Dr. E. J. Schreiner, Philadelphia Office

Norman Griswold, Branch Station Leader, Birmingham Branch,
Southern Forest Experiment Station

George Cashion, Philadelphia Office

A. Caporaso, Forest Survey Unit, Kingston, N. Y.

QUARTERLY REPORT--KANE EXPERIMENTAL FOREST

JULY-SEPTEMBER 1949

by A. F. Hough

GENERAL

The period July 1 - Sept. 10 was occupied by Hough and Research Assistant Charles E. Schomaker in field work on the Kane Experimental Forest and adjoining private and Allegheny National Forest lands. An inspection of the forest was made by Cashion July 5-8, 1949.

SILVICULTURE

Silvics-Black Cherry

The early part of the summer was devoted to the establishment of a strip plot in a 23-year old third growth stand containing 26 percent of the total stems 1" d.b.h. and larger in black cherry. The objective of this study was to determine the relative success of a narrow strip cutting (1 x 10 ch) on a lower slope site, in regenerating black cherry. The character of this reproduction with respect to origin, crown classes, vigor, and quality classes was recorded. The location of black cherry and associated regeneration with relation to the edges in center of the strip and in various 1/10 acre blocks along the strip was also tallied. A tally of the 57-year old second growth stand adjacent to this 23-year old cutting was secured for comparative purposes. Since nearly 80 percent of the 319 black cherry per acre were of seedling origin, about one-half were either dominant or codominant, 36 percent were vigor 1, and 18 percent quality 1, it seems that such strip cuttings on proper sites may be a good method of regenerating this valuable species. While 63 percent of the black cherry were located in the middle 50 links of the chain wide strip, the balance, or 37 percent, were in the two edge zones. This indicates black cherry to be much more tolerant than is generally expected.

A study was also made of tree regeneration on the Kane Forest power line in the vicinity of the few groups of black cherry reproduction found on the 2½ miles of cleared strip. This area has not been brushed for about 10 years and has largely reverted to grass, weeds, and ferns. Local groups of tree reproduction are taking over, but only on north slopes on the east side of this clearing which extends through older second growth stands.

Third growth in larger clear-cuttings for chemical wood.--A series of stocked quadrat transects were established in various third growth stands to determine the success or failure of such harvest cutting methods in regenerating black cherry. Indications were that seed trees left on a 20 acre clear cutting have had little effect in reestablishing black cherry. Wide scale clear cuttings made 4 to 8 years ago on 150 acres or more have not regenerated to acceptable amounts or desirable quality cherry.

In 11, 21 and 26-year old third growth stands on the Kane Forest, black cherry is less than 20 percent frequent on stocked quadrats and is generally of poor quality. These cuttings cover 15 or 20 acres in area each. In a heavily cut and burned area at the head of Wolf River, a 23-year old third growth stand is predominantly black cherry, but stocking is poor (18 percent) and tree quality very low.

HARVEST CUTTINGS

The Libby Run plot on Armstrong Forest Company lands, from which successive harvests of sawlogs have been made in 1894 and 1939 was re-measured. The last cut was to a 16 inch diameter limit and removed 11-7 MBF per acre. The growing stock left amounted to 12.3 MBF gross. Growth during the period 1939-1944 was at the rate of 196 bd. ft. per acre per year, being slowed by post logging mortality. The stands seemed to be in much better shape at the time of the 1949 remeasurement. A reproduction transect shows sugar maple and beech to be the chief species present in the dense groups of understory encouraged by the 1939 cutting.

Remeasurements were also made of the 5, 8, and 11 inch diameter limit pulpwood cutting plots covering 13.2 acres in the Wolf Run area of the Armstrong Forest Company. Reserved trees are growing rapidly and there is a fair to abundant regeneration of black cherry on the 5 and 8 inch plots. The per acre growth of the 8 and 11 inch limit series is better than that of the 5 inch diameter cutting plots.

MISCELLANEOUS

A show-me trip for 25 forestry students of the Penn State Forestry Camp at Blue Jay was conducted on July 20, 1949.

Visitors included Professor M. W. Mumfrey of Pennsylvania State College, Professor A. L. McComb of Iowa State College, Forest Supervisor R. J. Costley, Mr. E. H. Eyre of the Lake States Forest Experiment Station, Dr. John W. Bossard of Glen Burnie, Maryland, Mr. J. C. Rettie and family. A brief visit was made by Charles Lockard, Fred Simmons and George Doverspike of the Station.

Repairs to porches, steps, sills and a weather tower platform weakened by decay were made by two local carpenters. Fencing was removed from the red pine plantation, which is now above deer damage height.

QUARTERLY REPORT -- LEBANON EXPERIMENTAL FOREST

JULY-SEPTEMBER, 1949

by S. Little

GENERAL

Most of the effort during the quarter was spent on the revision of manuscripts, but some time was also spent on the remeasurement and maintenance of certain planting and prescribe -burning plots. In addition, preliminary tests were made on using ammate in killing upland and swamp hardwoods, and a survey was made of the reproduction resulting from a 1947 summer fire.

SUMMER BURNING

The summer fire was on July 14, 1947, and burned about 3 acres of pine swamp. The fire was hot, consuming most of the dense shrubby understory, all of the litter and F-layer, but little of the thick H-layer (2-6 inches deep).

The overstory trees, chiefly pitch pine 1-6 inches d.b.h., were severely affected. Except on the edge of the fire, all trees were killed back. Although sprouts started from many of the root collars, there are now few living sprouts--only on 5 percent of the stems killed by the fire.

However, there is a good stocking of seedling-pine reproduction in the burn. A tally of 100 milacre-quadrats showed that 92 percent of the quadrats were stocked with one or more pine seedlings, and nearly all the blanks were in a wet spot near the end of one line. The total number of pine seedlings was at the rate of 3,540 per acre, of which 82 percent were of 1948 origin. The other 18 percent started this year.

More than 3,500 seedlings per acre started after the fire, because many dead ones were observed. Most of these had been injured by deer or rabbits.

In contrast, there is little seedling-pine reproduction in the adjoining unburned stand, and practically none of recent origin. There on 100 milacre-quadrats only eleven pine seedlings were found, or 110 per acre. Only two of these had started within the last two years, both in one spot of moss.

Part of the seedling reproduction in the burn may have started from seed produced by fire-killed trees. On some pitch pines the mature cones do not open readily, but recent observations in the unburned area indicate that such trees formed only about 5 percent of the stand. Cutting tests showed that 50 percent of the seed in cones more than 2 years old, and 73 percent of the seed in cones 1-2 years old, were sound.

However, most of the reproduction probably came from seed produced by the adjacent unburned stand. There a good cone crop was borne in 1947, and a partial crop in 1948.

COOPERATION

The State Highway Department made extensive repairs to roads bordering or through the Experimental Forest. One black-top road 0.6 mile long was recoiled and sanded. Gravel roads 2.7 miles long were rescraped both before and after adding a 6-inch layer of gravel.

In cooperation with other agencies in New Jersey a meeting was held on September 1 to bring prescribed burning to the attention of owners of cranberry and blueberry bogs. Little presided at the meeting in the hall of the Blueberry Co-op and later conducted a show-me trip.

VISITORS

There were 164 visitors to the Lebanon Experimental Forest during the quarter. The larger groups included 42 teachers from the summer session of the Trenton State Teachers College and 88 persons attending the summer meeting of the Allegheny Section SAF. The schedule for the second day of the summer meeting was arranged chiefly by Little and included some of the prescribe-burned areas. On August 20 and 21 D. M. Smith of the Yale Forestry School and E. H. Tryon of West Virginia University visited several of the experimental areas in southern New Jersey.

QUARTERLY REPORT -- FARM FORESTRY RESEARCH
(Cooperative Project in Connecticut)

JULY-SEPTEMBER 1949

by R. H. Fenton

Work during this quarter underwent three interruptions, one for a short vacation period, but the others due to more drastic reasons of an emergency nature.

PRESERVATIVE TREATMENT

Sap Stream Methods

The report on treatment by stepping was completed and sent to the Station. Further work along this line will be carried out at intervals, but it was felt that sufficient data had been gathered to assemble a usable report.

In connection with this study, a cooperative arrangement has been verbally secured with the Chemistry Department at the University of Connecticut which will expedite the analysis of wood specimens for zinc chloride retention and distribution. A point still in doubt, in treatment by stepping, is the question of salt concentration at different heights of the tree as affected by the duration of treatment. This is rather important if the tree is to be cut into multiple products--less so if it is to be used intact. It is expected the quantitative analyses will be done by students, under direction.

The preservative bulletin #509 of the Connecticut Agricultural Experiment Station underwent a revision during this quarter and will be published in the near future as a bulletin of the Extension Service at the University of Connecticut. This branch has cooperated in the revision to the extent of suggesting and preparing a new and simplified table, which was adopted; contributing photographs; and, in general, reviewing the overall manuscript.

TIMBER CONVERSION

A small project in eastern Connecticut, suggested by this branch, was completed in part this quarter. This was the production of highway posts by sap peeling, for preservative treatment, red pine plantation-grown material prior to felling. This was mentioned in the 2nd quarter's report.

The operator carried out this method by two variations: peel to a 7-foot height the standing trees, then fell immediately, buck off the single product and pile for air seasoning; or, leave the peeled trees standing, uncut, for several days to expedite initial seasoning of the peeled section through moisture transpiration from the crown. Theoretically, the second variation should result in posts being ready for an

oil-type preservative treatment in the shortest period. Those trees, however, that were left standing for some time after peeling exuded a great deal of pitch from the peeled surface. This hardened into a nearly solid mass so it is doubtful if the preservative would be able to penetrate the wood. Hence, it was concluded that this variation was not satisfactory. A short paper is being prepared on this aspect of red pine utilization.

Usually, most plantation-grown red pine will not yield more than one post meeting highway specifications. However, the fortunate existence of a feltwood market for pine from eastern Connecticut makes possible nearly complete utilization of the remainder of the tree.

PRIMARY PROCESSING

Charcoal Manufacture and Utilization

The previous report mentioned a local mill operator's charcoal manufacturing enterprise by construction of a 10-cord cinder block kiln. It was found the kiln would actually hold about 12 cords. To date, four burns have been made with an average yield per burn of about 500 bushels--10,000 pounds--a yield of about 42 bushels per cord.

It has appeared worthwhile to follow this operation for a more precise determination of the cost of manufacturing charcoal in kilns of this type than is now available. The rough costs of a single burn have been ascertained, as follows:

Value of wood:	\$8 per cord at kiln--own stumpage	\$96.00
Loading kiln:	42 man-hours/.01, including some bucking; operator uses some wood 8' and longer	42.00
Burning kiln:	not considered as kiln requires only intermittent attention by operator who charges time to other work	----
Unloading kiln:	21 man-hours, including bagging and storage	21.00
Kiln depreciation:	estimated on original cost of kiln of \$330, assumed to last for 100 burns	3.30
Total		\$162.30

or \$0.0162 per pound.

The cost of the paper or burlap bags is not considered in the total cost as the operator includes their price in his sales. Cost of bags is as follows: used burlap-- $1\frac{1}{2}$ to 4 bushels: .07 to .10 each
paper, single ply, $\frac{1}{2}$ bushel: .018 each
printing on same: .012 each

This producer has made some sales this summer, largely for picnic use but has not yet recovered the original kiln cost. He is currently storing most of his production. Present sales average .038 per pound in

half bushel lots--30 cents for the contents, 5 cents bagging cost and 3 cents for the bag.

The operator is able to make about two burns each five or six weeks.

Wood Chips

It is now apparent that tests of the portable Massachusetts wood chipper will be carried out this November. It will be a cooperative research study involving the chipper manufacturer, the Connecticut Forest Service, the Northeastern Wood Utilization Council, and this branch. Collaborators will probably be the University of Connecticut, a wood dealer in New York and possibly one or more farmers. The cooperators held a conference in late September to formulate a general plan. One month's loan of the chipper with an operator has been assured by the manufacturer for the Connecticut tests.

A detailed report of the study will be issued, with the approval of the Station, as a Station paper.

At the above mentioned conference, preliminary plans were also made for time studies of the portable cut-off saw developed in Connecticut and improved by a New York concern. This project would follow the chipper study, probably next January.

PUBLICATIONS (Cooperative)

This branch has entered into an agreement with the Rhode Island Extension Service to contribute to a bulletin series in that state devoted to general phases of forest management. Tentatively, we will contribute a bulletin on Forest Planting and one on Special Products and Treatments--Christmas trees, charcoal production, wood preservation, etc.

NOTES

Late in September, Mr. Tomas Clark of Chile, who has spent nearly a year in this country on a student exchange basis with the Forest Service, visited this branch for one week to observe forest conditions in southern New England. Particular emphasis was placed on local means of utilization through the manufacture of charcoal and by wood preservation. He indicated that the local methods used in these forms of utilization were very practical for Chilean conditions.

QUARTERLY REPORT -- ADIRONDACK BRANCH

JULY-SEPTEMBER 1949

By Thomas W. Church, Jr.

INTRODUCTION

The drought of early summer prevailed during July. The 2 inches of rain that fell during the month served only to dampen the forest litter for short periods. One fire, originating on the railroad right-of-way about 8 miles from the experimental forest, ran through 85 acres of slashings before being controlled by the Conservation Department. Frequent rains in August and September reduced fire danger to a minimum.

CPL PLOTS

A cutting practice level study has been started in the spruce-yellow birch type. This type is both the most productive and the most extensive of the Adirondack types suited to softwood production. As a result of past cutting in this type, hardwoods have increased over spruce and fir until, in some cases, these species have been virtually eliminated.

Sample plots show that the stand selected is composed of approximately 45% spruce and fir, 10% hemlock, and 45% hardwoods. A fully stocked stand averaging 140 sq. ft. per acre is universal throughout the type. The variation by species within the plot is large; spruce and fir runs from 3 to 15 cords per acre, and hemlock and hardwoods from 0 to 3000 bd. ft.

Under proper management we believe these stands are capable of maintaining a stocking of 20 cords of spruce and fir, and 1000-1500 bd. ft. per acre of yellow birch. Hemlock and other hardwoods are generally poor and should gradually be eliminated from the stand. The chief silvicultural problem is to remove the undesirable and cull hardwoods which occupy 35% of the total basal area. An outlet for a portion of this material might be found in the slowly developing market for hardwood pulp.

Another problem is the length of cutting cycle. The growth rate and economic considerations indicate a minimum of about 10 years. Closely correlated with the cutting cycle is the question of what volume or basal area should be removed in the first cut. High-order and good practices call for a rapid transition which necessitates a moderately heavy initial cut. If this cut is excessive, however, inferior hardwoods and viburnum may take over the larger openings and offer serious competition to desirable softwood reproduction. Our marking, therefore, will have to conform closely to the varying stand conditions. In some cases it will be necessary to leave defective trees as trainers and site protectors.

Since the spruce-yellow birch type usually has an abundance of spruce and fir seedlings, adequate reproduction is a minor problem. Viburnum tends to flourish in the openings, however, so cleanings will

be necessary to keep it and the undesirable hardwoods from seriously retarding the softwood reproduction. Another cultural treatment will be the use of poison to eliminate the larger cull hardwoods.

The Adirondack Chapter of the New York Section, S.A.F., will hold its regular autumn meeting at Paul Smiths. The program calls for a field trip to the CPL plots at which time the above problems will be advanced for consideration. Discussion of such questions as the cutting cycle, cultural measures, and utilization of poor hardwoods by these foresters will help us to design a more effective experiment.

Hardwood Methods of Cutting

A $2\frac{1}{2}$ acre plot selectively cut in 1939 was recently treated with a 50% solution of sodium arsenite to reduce basal area about 30%. Deer exclosures were established on three plots in this series to determine the effects of deer browsing on the lower vegetative cover.

An additional plot was established on Finch, Pruyn and Co. lands adjacent to the check. Under a shelterwood marking, one-half of the basal area was removed by poisoning with a 50% solution of sodium arsenite. Trees treated were all highly defective.

Birch Dieback

Under agreement with the Bureau of Entomology we were to kill all cull trees 6 inches D.B.H. and above on a $4\frac{1}{2}$ acre birch study plot. Since the area has recently been cutover for softwood pulp and hardwood sawlogs, the residual stand consists chiefly of trees below 6 inches DBH.

This plot was treated with the same poison as mentioned above; the technique consisted of boring holes with a power tapper and filling them with poison from a spray gun. A time study of this operation showed that the treatment of 229 trees required 612 man minutes. This includes boring the holes, filling them with poison, walking between trees, brushing out around trees, filling poison guns, engine failure, starting motor, and short rests. The average tree poisoned was 14 inches d.b.h. and the average treatment time per tree was 2.7 man minutes.

VISITORS

T. H. Friedlin, timber engineer for the New York Central Railroad, spent a day here inspecting the forest and discussing future utilization of hardwoods for ties.

E. C. Wixson, of the New York Conservation Department, spent a day on the forest examining the condition of both white and yellow birch. He arranged for the establishment of a small study plot to record the progress of birch dieback.

Fred Simmons stopped by to assist with preparations for the Woods-mens' Field Day, and to observe the Wyssen Cableway System on Finch, Pruyn & Co. lands.

QUARTERLY REPORT -- ANTHRACITE BRANCH

JULY-SEPTEMBER 1949

THE POCONO EXPERIMENTAL FOREST

By S. M. Filip

CUTTING PRACTICE LEVEL PLOTS

To date, 798 tons of mine timber have been sold from these plots. Approximately 452 tons remain to be cut. The decline in anthracite production beginning last April and continuing through the summer months, coupled with large stock piles of mine timbers at the collieries, have caused a prolonged slump in the mine timber market. During this quarter only 34.5 tons of props were sold.

Most of the material still to be cut is in the lower diameter classes (under 9" d.b.h.) for which the operator now has very few orders. Sales should increase during the fall months.

As an aid in specifying methods for cultural work on the Good and High Order plots, to be done after cutting is completed, an informal test of treatments for killing stumps was put in on one High Order plot in July. Suppression of beech root suckers and stump sprouts of all species so as to allow establishment of seedling reproduction is one of the cultural objectives. Part of the above High Order plot, which was cut over last winter, contained a good many fresh stumps of beech and red maple, plus smaller numbers of hard maple and other species. From these, 116 sprouting or suckering stumps were selected and divided about equally among these treatments:

- (1) Dry ammate in axe notches.
- (2) Water solution of ammate, at 4 pounds per gallon, sprayed on stumps and on foliage of sprouts or suckers.
- (3) Treatments 1 and 2 combined.
- (4) Weedone Brush Killer 32, diluted 1 to 20 in diesel oil, sprayed on stumps and on foliage of sprouts and suckers.

More or less foliage browning has occurred with all treatments, but it is still too early to determine kills. Of special interest are several instances where standing beech trees in the vicinity of treated stumps are showing injury, evidently by translocation of the poison through inter-connected root systems. Dry ammate in notches seems to be most potent in this respect.

COMPARTMENT MANAGEMENT STUDIES

Boundaries have been established on the ground for the 40 compartments allocated to general management studies. Trees along the boundaries have been spot-painted blue, and corners are marked by 3-foot posts bearing metal tags identifying the contiguous compartments.

Initial inventories have been completed on Compartments 30, 33, and 34. Allowable cuts have been calculated and marking will soon get underway on Compartment 34. Compartments 30 and 33, which are respectively to be clearcut and cut to a diameter limit, will require no marking. Two more compartments (Nos. 23 and 27) are scheduled for inventory yet this fall.

The first draft of a work plan for the compartment management studies has been prepared by Burnham and staff. This has undergone preliminary review in Upper Darby and is now in process of final revision.

SMALL WOODLOT MANAGEMENT STUDY

A work plan for this study has been prepared by Burnham and approved by the Director. Boundaries for the two compartments involved were established and one of them was inventoried during the preceding quarter. The other compartment (No. 40) is to be managed by 4 sub-compartments, one of which will be cut each year on a 4-year cycle. The first of these sub-compartments was inventoried during the present quarter. This completes the preparatory ground work for the first cuttings, which are scheduled to be done this winter.

SUSTAINED-YIELD-WATER INFLUENCE STUDY

Construction of the weir and gage house has been completed. A water stage recorder in the gage house and two recording rain gages on the forest have been installed by the Delaware Basin Branch, and readings are now being taken. Only routine maintenance of these instruments will be done by the Anthracite Branch, supervision of the water aspects of the study being a responsibility of the Delaware Basin.

PHYSICAL IMPROVEMENTS

Construction of a cinder-block oil house, which was started in May, has been completed. All highly inflammable materials will be stored in this building. Besides conforming to safety requirements, this releases much-needed space in the Quonset equipment shed.

REGENERATION STUDIES

By W. E. McQuilkin

Scrub Oak Conversion

Survival tallies have recently been completed for all scrub oak plantings, but have not been analyzed. Except for one or two lots of poor-quality planting stock, survivals are generally good despite a dry

summer. Overall mortality on the Game Lands Area is about 10 percent and at Bear Creek about 20 percent.

Under-Planting Hardwoods with White Pine

Two of the 4 plots in this planting, made in 1948, were scheduled for future weedings and release. The need for such treatments has now developed. The question arose, however, whether release now would increase the amount of deer browsing by making the seedlings easier to see and reach. Accordingly, the release plots were divided, one-half of each being released during September, and the other half of each left for release early next summer.

No fall survival counts have been made on these plots. Informal observation indicates some, but not excessive, mortality among the more severely browsed trees. However, among the living, recovery from last winter's browsing is only fair. Many seedlings have merely survived, making no appreciable growth.

Plant Poisoning Studies

The cooperative arrangements with the American Chemical Paint Co. mentioned in our last report materialized in August. The company furnished, a number of mixtures of 2, 4-D and 2, 4, 5-T, one gallon of Weedone Brush Killer 32, 25 gallons of diesel oil; a Briggs and Stratton motor pump, and assistance in mounting the pump assembly on a truck. In return, the Station is providing space and some assistance to the Company for tests of their own.

Sixty one-hundredth acre plots were treated with hand sprayers, mostly using various mixtures and concentrations of 2, 4-D and 2, 4, 5-T in oil and in water, plus a few other materials. Twenty four strip plots were treated with the motor pump mounted on a Jeep truck equipped with a light bulldozer blade. As the brush was pushed over and somewhat skinned and bruised by the blade, the spray was fed onto the stems immediately behind the blade. In addition to these tests, about an acre was treated with Weedone 32 in diesel oil, and another acre with ammate water solution. Both of these acres were treated in strips 4 to 5 feet wide and 8 feet apart, center to center. These will be planted to trees next spring as a practical test of site preparation by chemical means.

All of these tests are on the Delaware-Lehigh Experimental Forest, and were established in cooperation with the Delaware Basin Branch.

VISITORS

During the past quarter we have entertained the following visitors, usually by show-me trips to some or all of our field installations.

Joseph Ibberson, Pennsylvania Department of Forests and Waters, 2 days.

Professor H. H. Chisman and Samuel Anthony, Pennsylvania State College of Forestry, 1 day.

T. J. Hughes, Wyoming Seminary, 1 day.

Dr. Charles B. Reif and botany class, Wilkes College, one-half day

Mr. James McDonald, British Forestry Service, 2 days, in company with I. H. Sims

Mr. Tomas Clark, an exchange student from Chile, 4 days.

Miss Dorothy Eshelman, reporter for the Wilkes-Barre Record, 2 days, gathering material for news stories.

QUARTERLY REPORT--CHESAPEAKE BRANCH

JULY-SEPTEMBER 1949

by Francis M. Rushmore

VIRGINIA PINE THINNING PLOTS

Most of the time during this quarter was spent on the manuscript of the Virginia pine thinning study. The draft was completed and sent to Upper Darby for review.

PLANTING IN THE ASHES OF BURNED SLASH PILES

The establishment report for this study was completed. Preliminary measurements were taken in August. At this time, the tulip poplar and loblolly pine seedlings, and the hybrid poplar cuttings had been growing for four months. The height growth during this time was greater where slash had been burned than it was on the check plots. The height growth of hybrid poplars planted on the burned spots was 5 times greater. The height growth of tulip poplar planted on the burned spots was 3 times greater. Loblolly pine grew nearly as well on the check plots as it did on the burned plots.

On August 24 the terminal buds of the hybrid poplars had hardened. The tulip poplars and the loblolly pines were still growing at this time.

CUTTING-PRACTICE-LEVEL PLOTS

The plan for cutting the pine stand has been approved. Sample marking has been completed. We are now looking for a cooperator to do the cutting.

PERSONNEL

E. J. Schreiner transferred to the headquarters at Upper Darby in July. H. J. Williamson was transferred from the Massabesic to be in charge here. He left here September 15, on leave, to attend the Yale School of Forestry to work for his masters degree.

MISCELLANEOUS

A fire on July 29 completely destroyed Ford's residence and both wings of the exhibit shop. The fire was beyond control when it was discovered.

Office facilities are being used for Forest Survey work by Ted J. Grisez, W. M. Ellsbury, and T. S. DeLong. They are beginning work in some of the eastern counties of Maryland.

MORRIS ARBORETUM

by Jonathan W. Wright

The work during this quarter consisted principally of caring for nursery trees of previous years' controlled breeding, and of harvesting the control pollinated seed from 1948 and 1949 spring breeding seasons.

In Norway maple and boxelder moderate quantities of full seed were harvested from intraspecific crosses and crosses with closely related Asiatic forms, but little or none from crosses with unrelated American species. In the ashes moderate quantities of full seed were harvested from crosses of European ash (female) with closely related American (black, blue) species, and from crosses of green with the closely related Arizona ash. However, the crosses of green with white ash again appeared to be unsuccessful.

In the conifers only the seeds from the white pine crosses from the spring of 1948 have yet been extracted. Generally seed sets were heavier than in the previous year and nearly all the more than a score of interspecific crosses tried gave some normal-size seed. Due to the known prevalence of induced parthenocarpy, it is yet too early to say how many of the seeds will grow.

Observations on flowering and fruiting on several hundred trees were continued for the third and fourth years. Many trees have been found which fruit moderately to heavy every year whereas others have matured few or no fruit in the period covered. In some species, however, the well-recognized pattern of "on" and "off" years has been encountered.

QUARTERLY REPORT--DELAWARE BASIN BRANCH

JULY-SEPTEMBER 1949

by Irvin C. Reigner

As we write this, we realize with regret that the summer has passed - too quickly. There are always so many things to do during this season. But, it was an unusually good summer, allowing us to spend a large part of our time in the field. The results include new installations, further knowledge of our watershed, and a lethal attack on our scrub oak problem.

INSTALLATIONS

A second climatic station was completed during the quarter at a site near the center of the watershed. Both stations are now in operation and readings are taken daily. Each station includes a recording rain gage, anemometer, hygro-thermograph, and maximum and minimum thermometers. In addition, a fire danger station is located at Pimple Hill. In the determination of the fire danger such factors as fuel moisture, wind velocity, condition of vegetation, and others are combined in varying degree to give the fire condition for that immediate time. The resulting information is valuable particularly during the fire seasons.

The Department of Forests and Waters has a bulldozer at the watershed at present, renewing the fire strips around the planting plots and widening and improving the road crossing the watershed. The state is also in the process of erecting gates at the various entrances to the watershed area.

Further improvement is being made at the resident hydrographer's residence on the top of Pimple Hill.

In order to supplement the information now being collected from our groundwater wells, another well was dug near the swamp at the head of Dilldown Creek. At a depth of seven and one-half feet below the ground surface no water was encountered, showing that the groundwater level was below this depth. In an effort to determine the elevation of the groundwater, a second pit was dug, this time in the middle of the stream channel (which is dry at present), some six feet below the ground level at the first pit. Water has finally been struck at a depth of six feet.

During the course of digging the second pit, a saturated zone with some water seepage was struck at about a depth of one and one-half feet. This zone, lying above an apparently impervious layer of clay soil, indicates the presence of a perched water table during part of the year. The intermittent characteristic of Dilldown Creek in this localized area gives further evidence of a possible perched water table. Thus, swampy conditions could prevail even during periods when the true water table is a number of feet below the bottom of the swamp.

It is proposed that water levels be recorded at each of these pits to give a range of conditions throughout the year. An attempt will be made to seal off the wells through the impervious layer of soil to prevent seepage from the perched water table. A third shallow well will be dug just to the top of the impervious layer and equipped with a recorder. If successful, we will be able to measure the height of the true water table at the swamp and also the amount of storage in the perched water table.

Storey and Price assisted in the establishment of a watershed study at the Pocono Experimental Forest. A streamgaging station similar to the one on Dilldown Creek was constructed and two recording raingages were installed.

CLIMATE AND STREAMFLOW

Following the completion of our second climatic station, records have been taken at both stations since July 1. Comparisons can now be made.

Practically no difference was found in average temperature between the two stations. However, a wider range of temperature was found at the station in the middle of the watershed than at the station on top of Pimple Hill; the average minimum temperature was lower, and the average maximum was higher.

This may be the result of one or a number of variables between the two sites. There is approximately 320 feet difference in elevation. The vegetation is not greatly different between the two areas, but is more uniform in size and density in the watershed. We have found that average wind velocity is higher at Pimple Hill than in the watershed. This in turn, is a result of topography; the one climatic station is in a valley while the other is at the highest point in the locality.

The relationship between rainfall and streamflow is as follows:

	Ave. rainfall over the watershed	Runoff at weir - in inches depth over the watershed
May	7.26	5.04
June	1.02	1.39
July	4.12	0.81

Peculiarities in the relationship during June and July will be noted. Streamflow during June is actually higher than rainfall, indicating a depletion in the groundwater reservoir. Our groundwater records give evidence to this premise, showing a consistent drop in water level.

The relatively high rainfall during July, together with the low streamflow indicates that very little precipitation was reaching the stream. The wells continued their gradual drop during the month and the

following period showing that no rainfall was reaching the groundwater reservoir. In this case, therefore, most of the rainfall was utilized in replacing water losses caused by evaporation and transpiration.

SOILS

Calibration of soil moisture units in the first set of soils was completed and the units were placed at the site for which they were calibrated. Soil samples were taken at two other sites and units have been calibrated for the respective horizons at these sites. The units will shortly be put into field operation.

Bethlahmy has begun a soils survey of the watershed area. Observations are being made and samples taken at specified intervals along parallel lines crossing the watershed.

So far, the soils observed have been similar to the soils previously sampled at our soil sampling sites. One of the plots, however, fell in one of the numerous boulder fields scattered throughout the watershed. No mineral soil was encountered at this plot, but a layer of humus covered the rocks and supported the usual stand of scrub oak and scattered pine sprouts. Should this humus layer be destroyed by fire a field of bare boulders will be the result.

Soil acidity tests show that we have a rather acid soil with little variation from one locality to another. Greatest acidity is found at the surface with a pH of 4, decreasing to a pH of 5 in lower horizons.

Within the area sampled, it has been found that the majority of roots are concentrated in the humus and the upper 4 inches of mineral soil. No roots have been found deeper than 18 inches.

SCRUB OAK CONVERSION STUDY, DELAWARE-LEHIGH EXPERIMENTAL FOREST

Poisoning

In search of still other methods of site preparation for scrub oak conversion, an intensive study of vegetation poisoning was started at Dilldown during the quarter.

Sixty plots were established on state land adjacent to the watershed and a cover survey was made for each plot. Various concentrations and combinations of 2-4-D and 2-4-5-T were used, both in oil and water solutions. Ammate, a DuPont product, was also tried in different concentrations. Each solution was sprayed on all vegetation within a plot; some plots were designated to have both foliage and stems receive spray while only the foliage was sprayed on other plots.

A mechanical method of applying the spray was also tried. A spray boom consisting of six low-volume nozzles spaced about one foot apart was mounted behind the snow-plow blade of the jeep assigned to the resident hydrographer by the state. As the jeep drove along, the blade bent, broke, and scarred the brush, while at the same time the poison was being sprayed on the lower stems. This followed up previous research in which a spray

on the lower stems of woody vegetation was found to be very effective.

Strips were established to test this method of application, using 2-4-D and 2-4-5-T in various combinations, both in water and oil solutions.

Finally, one complete acre was sprayed by this method using a combination of 2-4-D and 2-4-5-T (Weedone 32) in oil solution. Another acre was sprayed with Ammate; in this case, however, the spray was applied to foliage only.

Fine cooperation in this project was received from the American Chemical Paint Company of Ambler, Pennsylvania, which supplied the 2-4-D, 2-4-5-T and the mechanical spraying equipment. In addition, they have tested some of their newest herbicides in other plots in the same area.

The study was supervised by W. E. McQuilkin of the Anthracite Branch and conducted by personnel from both branch stations.

Plantings

Release treatment, including mowing, was made on all plots designated to receive such treatment. In addition, all living trees in the roadside strip were released from competition. This work was carried on during July and August by personnel from this branch station and the Anthracite Branch whenever time was available from other activities. In general, all species were overtopped by scrub oak sprouts, except the more vigorous individuals of black locust.

An observation tallying mortality was made on all plots in September. It was decided that no record of height growth be made this year. Although total mortality and second-year mortality have not yet been computed, a few general observations can be made.

A high percentage of pitch pine replanted this past Spring are now dead. This is due, again, to poor planting stock. As in the Spring of 1948, many of the pitch pine seedlings were spindly and weak.

A high mortality was found in the hybrid poplar, and many of the remaining individuals appear to be dying.

Defoliation of jack and pitch pines, probably by sawfly larvae, was rather frequent, probably more frequent than in 1948. Jack pine was affected to a greater extent than pitch pine, but many individuals of both species will probably survive. Defoliation occurred during the latter part of August and during the time of the tally.

Natural Regeneration

While the state-owned bulldozer was at Dilldown, it was agreed upon to set up a small study on natural regeneration.

Since this appears to be an unusually good seed year, four strips were made by the bulldozer on the leeward side of a group of seed bearing pitch pines. Scrub oak and the thick humus layer was removed and the mineral soil was exposed for the full width of the blade.

The study will test the effect of exposing mineral soil as the area between strips was not touched. Since the strips extended approximately 300 feet from the seed trees, we shall also find to what distance from seed trees natural regeneration may be expected.

TOPOGRAPHY

A topographic survey was continued during July, although interrupted during August and September by the press of other work. Boundary mapping is now in progress in the southwestern part of the watershed. The U.S.G.S. has completed its job of determining elevations of the groundwater wells and the weir with reference to mean sea level. During the course of their work they also set a number of bench marks throughout the area for our use in the topographic survey.

FROST STUDY

Trimble and Miller, of the Division of Flood Control Surveys, conferred with us in Bethlehem about possible frost problems for this winter. It was decided that Trimble should approach Dr. Bramble of the Forestry Department at the Pennsylvania State College in an effort to have one of their graduate students do a laboratory type of investigation. Further data on frost will be obtained in conjunction with the soil moisture studies at Dilldown.

INSPECTION

Mr. Bevan and Mr. Sims were at Bethlehem from August 15 to August 19 for the annual general inspection of the branch station. Mr. Bernard Frank, from the Division of Forest Influences in Washington, was also a member of the inspecting party for part of the week. Numerous helpful recommendations were made as a result of the inspection.

MEETINGS

Storey was introduced to the mountains of West Virginia during the first part of September when he attended the annual meeting of the Station's Advisory Council. While in West Virginia, he also helped in the inspection of the Mountain State Branch.

Bethlahmy attended a meeting of a group of foresters and soil scientists interested in the classification of forest humus held on September 7, 1949 at the Pack Demonstration Forest. The conference proved to be quite worthwhile and made definite progress toward establishing a workable classification.

QUARTERLY REPORT — MOUNTAIN STATE BRANCH

JULY-SEPTEMBER 1949

by Carl J. Holcomb

GENERAL

The Mountain State Research Center got out of its diapers and into its training pants on July 1 of this year. The first quarter of its second year of operation has been a very satisfactory one to the staff. Much of the first year's planning is now becoming a part of an action program.

FERNOW EXPERIMENTAL FOREST

The Fernow Experimental Forest is now in active operation. The compartment management plan has been approved and the working plan for compartment management studies has been submitted to Upper Darby.

Our logging operation was preceded by the following steps:

1. Markets were obtained for the products to be harvested. This was done through cooperation with local industry. Informal sales agreements for all products of the sawmill, including sawdust, were made.
2. A cooperator for the timber management studies was selected. He has entered into a memorandum of agreement with us. He is Woodrow Price of Tucker County, a young, adaptable, aggressive, and competent sawmill operator. The agreement covers the erection of a sawmill to be built to our specifications and the purchase of our products at the landings.
3. A special use permit was issued to Woodrow Price for the erection of a sawmill on the Fernow.
4. The logging equipment was purchased or rented. The Center owns all of its small tools, a power saw, and an Issacson Karry Kart (logging sulky). A D-4 caterpillar tractor was rented from the Monongahela National Forest at standard Forest Service rates.
5. A woods crew was hired.

All of the above steps have been completed. The Fernow now has a going logging and sawmill operation. The sawmill, a steam operated plant with a Frick No. 01 mill, has been set up. The cooperator's father, an old millwright and sawmill operator, assisted in the erection of the mill. Part of the slabs and edgings are used for fuel in the boiler. The best is being cut into fuel wood for sale in Parsons. In place of the usual burner, a loading bin for sawdust has been erected. The sawdust will be sold to the Forest Service nursery in Parsons. An edger for the mill has been ordered. The first shipment of finished lumber, 9/4 sugar maple, was delivered September 29.

The woods end of the operation is in charge of our Forestry Aid, Carl R. Barr, who has been designated logging superintendent. He has a woods crew of three men under him. Skid roads have been built. The high-order cutting practice level plot has been cut and the logs skidded to the landing.

Skid roads have been built in the farm woodlands compartments. Construction work was done by the Soil Conservation Service, with whom we are a cooperator. All operations in the farm woodlands, incidentally, are planned for execution in a way which is possible for a farmer to duplicate at minimum cost.

An extension of the Fernow road system is planned for this winter. Amended plans for a complete system of forest roads are being worked on and will be submitted to Upper Darby during the next quarter.

MEETINGS AND INSPECTIONS

West Virginia was host to the Northeastern Forest Research Advisory Council at Jackson's Mill on September 8 and 9. Weitzman made the local arrangements. Station staff members present were the Director, Jim Rettie, Charles Lockard, Art Bevan, Fred Simmons, Herb Storey, and Sid Weitzman.

The Mountain State Research Center Advisory Committee met at Jackson's Mill on September 22, preceding the West Virginia Chapter meeting of the Society of American Foresters. Weitzman, Holcomb, and Barr made progress reports of the work at the Center. Weitzman outlined plans for this fiscal year. The Committee unanimously expressed its appreciation for the way in which the Center has solicited the help and advice of the people and agencies in West Virginia in the establishment and carrying out of the Center's program.

Dr. Harper, Sims, and Storey made a general inspection of the Center on September 10-13.

Weitzman, Holcomb, Clark and Barr attended the West Virginia Chapter meeting of the Society of American Foresters at Jackson's Mill on September 22-24.

Weitzman and Clark spent three days in Upper Darby conferring with Sims.

Holcomb spent four weeks in Upper Darby setting up his growth study for tabulation on the Remington-Rand machines and conferring with Bickford on analysis.

PERSONNEL

Sidney Weitzman, Research Center Leader, left for a three month's detail in Washington at the statistical training school

Carl J. Holcomb is acting Research Center Leader during the absence of Weitzman.

Thomas G. Clark has had the scope of his work expanded to include studies in forest influences.

Two timber cutters, Norman Long and Oscar Hardy, have been added to the woods crew on the Fernow.

Frank Vande Linde, our student assistant for the summer, has returned to the Forestry School at West Virginia University.

SPECIAL STUDIES

H. Spencer Potter's survey of spoil bank revegetation has passed the rough draft stage.

Holcomb's study of growth in cove hardwoods and second growth yellow-poplar is in the analysis stage.

A study of skid road erosion is being established on the Fernow under the supervision of Tom Clark.

MISCELLANEOUS INFORMATION

Tom Clark reports that Southern Glo yellow marking paint, when used with kerosene base--on a damp surface, washes off very quickly. Paint marks on trees selected for cutting on the Fernow were almost completely washed off within a month.

The Fernow Experimental Forest has furnished the logs for the sawing and wood chopping contest for the Mountain State Forest Festival.

VISITORS

Roy Chapman and Al Bickford spent two days in Elkins and vicinity to evaluate methods of relocating Forest Survey ground plots.

Sims spent several days at the Fernow to assist in ironing out the compartment management plan.

The Dons, Gedney and Whalen, from the Division of Flood Control Surveys investigated flood damage on the Potomac Drainage resulting from the disastrous flood of June.

Allan Heilmann, Danish forester, spent two days on and around the Fernow Experimental Forest investigating seed sources of yellow-poplar, red oak, and black locust.

"Andy" Anderson, Supervisor of the Monongahela National Forest spent a day at the Fernow discussing plans with the Research Center staff.

Other signatures on the guest book at the Bunkhouse and Office, Fernow Experimental Forest: Jim Rottle, Upper Darby; Bill Huber, R.O.; Margate Kienast, W.O.; Charles Hall, District Forester, West Virginia Conservation Commission; Dave Sterling, County Forester, West Virginia Conservation Commission.

QUARTERLY REPORT--PENOBSCOT BRANCH

JULY-SEPTEMBER 1949

by T. F. McLintock

EXPERIMENTAL FOREST

At last all legal obstacles seem to have been overcome in the administrative agreement among the nine companies participating in the acquisition of the experimental forest tract. Probably this agreement will be signed in October. Several more minor changes in the lease have been agreed upon. If nothing further develops to delay matters, it looks as if the Penobscot Experimental Forest will come into being before the end of the year.

Some preliminary work has already been started on the forest. The network of old winter haul roads is being traversed and plotted in order to aid in future development plans and to orient ourselves on the property. In most cases a little swamping would put them in usable shape again. Even now the Lillys truck can be driven nearly a mile over one of the roads.

Besides the road traverses, 10½ miles of the boundary have been located and respootted, and 29 corner posts have been found. The land in and around the forest was first surveyed in 1803, with subsequent re-surveys late in the 19th and early in the 20th centuries. Dates on the corner posts range from 1889 through 1915, 1916, 1919, 1921 to 1949. Blazes from the 1915 and later surveys can still be found with a little searching and by using the staff compass occasionally. Alder swamps and recently cutover places give some trouble with lines, but corner posts have been found.

A fire plan for protection of the experimental forest is being drawn up. A 14-foot rowboat and a 5 h.p. outboard motor have been purchased for use in fire protection and for carrying men and equipment. Practically the entire eastern boundary of the forest is on water navigable by the boat. Materials have been purchased for building a combination garage and workshop at the headquarters site. (by A. C. Hart).

BUDWORM EXPERIMENTAL CUTTINGS

Establishment of permanent study plots has been completed on two additional areas, bringing the total number of fifth-acre plots to 233. These plots will be used not only to follow the effects of budworm attack, but also to study growth and mortality of residual stands.

Selection of sample trees has been completed on three more areas. This makes a total of 620 numbered spruce and fir trees which have been measured and described in detail. In order to locate them easily for subsequent remeasurements, these sample trees were selected within the study plots. They will provide a basis for following the effects of budworm feeding on individual trees of different size, vigor and other

characteristics, and for studying tree growth and development after logging.

More than 900 acres of budworm experimental cuttings have now been established in Maine. (by A. C. Hart)

ADHERENCE OF CUTTING TO MARKING

Summaries of the volume in unmarked trees cut, and marked trees not cut were made for three of the budworm cutting areas. Compliance with marking varied considerably. Based on volume marked, the percentage not cut ranged from 7 to 14 percent, with an average of 10 percent. The percentage cut but not marked varied from 3 to 16 percent, with an average of 11 percent.

On Area No. 1 the volume in marked trees not cut offset the volume in unmarked trees cut. On Area No. 2, a "stumpwood" job, the volume in marked trees left standing failed to balance volume in unmarked trees taken. In fact, this area was overcut nearly 0.7 cord per acre. Area No. 3 ran to the other extreme. It was undercut 0.5 cord per acre.

Comparing volumes, however, does not tell the whole story. Trees marked for cutting were selected for definite reasons: to reduce the budworm hazard, and to increase the vigor of the stand by removing poor risk trees. When the pulpwood cutters made substitutions it is very likely that they took a good risk tree and left a poor one.

Probably the main reason Area No. 2 was overcut is that, being a "stumpwood" job, a greater proportion of the acreage went into roads. Acreage in roads on one of the yarded wood jobs amounted to 3 percent of the area. A comparison of the proportion of each area in roads will be made when such information becomes available. (by W. J. Kidd, Jr.)

WIND DAMAGE

Windthrow and wind breakage is summarized in table 1. Heaviest damage per acre has been the loss of three trees representing about 0.2 cord, on the area recruited two years after cutting. First year mortality on three other areas has been less than 0.1 cord per acre. As might be expected, most of the loss has been in the less windfirm balsam fir.

GROWTH STUDIES

Considerable progress has been made this quarter in working toward a uniform system of growth study plots to be put in cooperatively by timberland owners and this Branch. Another meeting was held in September with foresters and woods managers for large timberland owners--mostly paper companies--at which time it was agreed to draw up a set of specifications for permanent growth plots. These will include such items as size and shape of plots, means of marking, identifying and tying in plots, and minimum essential data to be taken. Each company will submit a detailed plan of their present procedures and recommended changes. The

Table 1.—Wind damage¹ to residual spruce and fir, 6 inches d.b.h. and up, following cutting on four experimental areas in Maine.

Species	Area 1 ²		Area 2 ³		Area 3 ³		Area 4 ³	
	Trees per acre	Cords per acre	Trees per acre	Cords per acre	Trees per acre	Cords per acre	Trees per acre	Cords per acre
Spruce	0.37	0.03	0.21	0.03	None	None	None	None
Fir	2.78	.19	.62	.04	0.47	0.06	0.45	0.02
Total	3.15	0.22	0.83	0.07	0.47	0.06	0.45	0.02

¹Includes trees uprooted, broken over, or with top broken.

²Two years after cutting.

³One year after cutting.

(by W. J. Kidd, Jr.)

Branch Station will then combine these procedures and recommendations into a single guide or outline which, when approved by all companies, will become standard for all growth plots established by this group.

Next to be worked out are other fundamental issues such as sampling technique, number of plots required for given accuracy, and a satisfactory site classification. Some progress has already been made on these matters but a good deal of thought and work still have to be put in on the whole problem. Most efficient use of aerial photos in connection with growth studies is also being given a great deal of consideration.

VOLUME GROWTH TABLE

Intelligent timber marking in spruce-fir stands calls for sound judgement as to the earning power of any tree left as an investment, as well as to its silvical relations with the rest of the residual stand. In an effort to enable practicing foresters faced with this problem to evaluate questionable trees this Branch has developed a quick and simple system of volume growth determination. A table has been prepared showing growth in cubic feet corresponding to diameter growth in inches, for spruce and fir of different d.b.h. A local volume table was constructed from a standard table showing merchantable cubic foot volume inside bark. A curve of volume over d.b.h. was drawn which permitted reading volume to the nearest tenth-inch. The volume of a tree at the midpoint of each class was used as a base point and subtracted successively from the volumes of trees one-tenth inch larger. For example, in the 8-inch class the volume of a tree 8.0 inches d.b.h. was subtracted successively from those of trees 8.1 inches, 8.2 inches, 8.3 inches d.b.h., etc. The differences represent increases in volume corresponding to increases in diameter over a five-year period (or ten-year or six-year or any other period) of 0.1 inch, 0.2 inch, 0.3 inch and so on. These growth figures were

computed up to the largest diameter growth expected for the previous five-year period, which was 1.5 inches for fir and slightly less for spruce. These were tabulated for each diameter class as shown in the partial table for balsam fir below.

By boring a tree and measuring the radial growth for the last five-year (or any other) period the actual volume growth can be read from the table. To get an idea of what the growth represents in terms of earning power, growth percentage can also be calculated and included in the table.

The usual precautions regarding the preparation and use of local volume tables should be observed, though slight differences in average heights from place to place in the same type have not been found to be of importance.

Table 2.--Merchantable volume growth in cubic feet, inside bark,
balsam fir, T 5 R 18, Maine. (Corresponding to diameter
growth, inside bark.)

D.b.h.	Growth in inches, inside bark									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
6	0.13	0.39	0.59	0.79	0.98	1.17	1.36	1.58	1.78	1.98
7	.20	.40	.61	.82	1.02	1.23	1.45	1.70	1.92	2.13
8	.22	.44	.67	.89	1.11	1.33	1.56	1.82	2.06	2.29
9	.24	.48	.73	.97	1.21	1.44	1.68	1.95	2.20	2.45
10	.25	.51	.76	1.03	1.28	1.54	1.80	2.07	2.34	2.61
11	.27	.54	.82	1.09	1.36	1.63	1.92	2.20	2.48	2.77
12	.28	.56	.86	1.14	1.42	1.72	2.04	2.33	2.62	2.93
13	.29	.59	.89	1.20	1.50	1.81	2.16	2.47	2.78	3.10
14	.31	.63	.97	1.28	1.59	1.91	2.29	2.58	2.94	3.28

MISCELLANEOUS

Our two agricultural aids, Paul E. Marshall and Marvin L. Chitty, terminated their employment early in September. Chitty is at present temporarily employed by one of the pulp companies on a cruising job.

George Cashion spent two days with us on a fiscal inspection during September. It was nice to become acquainted with George, talk over fiscal procedures, and catch up on Station and Region news.

QUARTERLY REPORT—WHITE PINE BRANCH

JULY-SEPTEMBER 1949

by John R. McGuire

GENERAL

July and August were unusually dry and woods bans were in effect much of period. September rainfall was considerably above normal.

In Maine, an improved fire control organization is now functioning. McConkey sat in on a local training meeting for deputy fire wardens.

Branch administrative work was inspected by Cashion in September.

The white pine market is still weak in many respects. Box boards, No. 4 common and 4, 5, and 6 inch boards of all grades are moving rather slowly. The Champlin Box Company's plant at Rochester, N. H. burned down on September 21. As a result many small mills in this vicinity are without any market at all. The Shepard-Morse mill at Alfred will not be in operation until sometime in November.

The Massabesic road plan has been revised. The White Mountain road crew is spending about a month on maintenance and culvert replacement on the Massabesic Forest.

The construction of the Connecticut type charcoal kiln was completed in the early part of July. The first trial operation is now underway.

COMPARTMENT STUDIES

As a result of the fire at the Shepard-Morse sawmill at Alfred, it was necessary to change the Massabesic compartment cutting schedule and to find a new cooperator.

Early in August, the L. L. Clark Lumber Company of Clark's Mills, Maine, signed a cooperative agreement covering the logging of compartments 3 and 4 on the northern unit. The company agreed to the use of NETSA log grades for white pine and to pick up logs on the brow at each compartment.

After a safety and crew-training meeting on August 15, logging started on compartment 3. Charles E. Sweet and Raymond W. Lavigne are employed as choppers. Sumner F. Ricker acts as foreman and tractor operator. The crew alternates between chopping and scooting. Trees are felled and bucked with a power saw. Logs are loaded on the scoot using the tractor boom and winch. The tractor then hauls the loaded scoot to the brow at roadside. About 600 board feet is a good scoot load in small timber.

Compartment 3, treated as an example of poor cutting practice, will furnish about 55 MBM of logs. Logging will start on Compartment 4--to be harvested in patches according to good cutting practices--in the early part of October. The cutting practice level plots and compartments 78 and 85 will be logged thereafter. Marking has been completed on compartments 4 and the CPL plots. Record keeping and volume table checks are underway.

CARTRIDGE PLANTING

Williamson will carry out some greenhouse tests of white pine seedling cartridges while he is at Yale this year. The branch will furnish seed and other supplies. His work will determine whether further study in this method of planting is worthwhile. Briefly, the aim of this study is to see whether it is practicable to germinate pine seed in soil cartridges under optimum conditions and then to plant the cartridges soon after germination, as the horticulturists do with many other plants.

WHITE PINE WEEVIL

The white pine weevil study mentioned last quarter got underway in July. Professor Ishman of the University of Maine and Fred Knights of B.E.P.Q. visited the Massabesic to select various plot areas. Semi-permanent plots, distributed through the White Pine Region of Maine, will be used for annual observations of changes in the weevil population. It may also be possible to correlate weevil incidence with certain stand characteristics such as age, composition and density.

WHITE PINE FIRE-DAMAGE STUDY

Despite an unusual summer drought and rather heavy infestation of the red turpentine beetle, mortality of fire-damage study trees in the Massabesic burn increased less than 10 percent the second year after the fire. Sapling mortality accounts for about 60 percent and sawtimber about 15 percent of the total kill measured in numbers of study trees. Observations this fall confirm previous indications that mortality is greater in pure pine than in mixed pine stands and that crown damage is less important than root damage for judging risk.

VISITORS

Dr. H. B. Peirson, Maine State entomologist, and two members of his staff, Ed Duda and Frank Manning, visited the Massabesic during the quarter. Some of their plots on burned areas show pales weevil damage even though no white pine has been cut in the immediate vicinity since the 1947 fire.

Engineers Crawford of the White Mountain National Forest and Seitz of the Regional Office looked over the new Roberts road. John Holden of the W.O., Stump of the R.O., Crawford and Martin of the White Mountain visited Alfred for the same purpose.

Robert Willets, selectman of Brownfield, Maine, came in several times to see our charcoal kiln and to talk about costs and markets. He is interested in charcoal as a possible new industry for his town. His first kiln is now under construction.

John Regan of B.E.P.Q., who worked on the airplane seeding project here, came back on his vacation to see the results.

Gordon Condit, chief forester for the Crossett Lumber Company, re-visited the Massabesic after eight years. He was stationed here before the war. (We've heard of many foresters making the pilgrimage to Crossett but this is the first instance we know of a Crossett forester coming North--on his vacation, at that.)

Other visitors were Ernie Schreiner, Brown and MacAloney of B.E.P.Q., Butterfield of the W.M.N.F. and Vic Jensen. Trayer of the W.O., Lockard and Simmons spent a day in this vicinity looking over the logging job, kiln, and other operations on the Massabesic and the Gunter plant at East Baldwin.

QUARTERLY REPORT--WINNIPESAUKEE BRANCH

JULY-SEPTEMBER 1949

by V. S. Jensen

Practically all drought records for Vermont and New Hampshire were broken during the first $2\frac{1}{2}$ months of the quarter. In spite of these conditions, forest fire losses were not serious and these occurred largely in the southern sections of the two States. Protracted rains the latter part of September should ease the situation at least until the fall fire season.

NORTHERN HARDWOODS MANAGEMENT

After a lapse of 8 years, the northern hardwood management project was resumed on July 1. A limited amount of time was spent on the Green Mountain National Forest. Otherwise, the program for the quarter was mainly a reexamination and evaluation of conditions on intensive cutting areas which had been established from 1933 through 1941.

Regeneration

Methods of cutting experiments on the Bartlett Forest provide an opportunity to assess the relative merits of different systems as they affect the development of the new stand. Field procedures to evaluate results were developed with the advice and assistance of Mr. Dickford. The major job, office analysis, has not been started, so results are based on field impressions and a cursory examination of data collected. Tentatively, best results were obtained after making patch cuttings followed by tree selections and clear cutting. White ash, yellow birch, and paper birch, all desirable species, were most abundant on the patch areas, beech and sugar maple were well represented on all areas, and wood species, particularly pin cherry and red maple, were most abundant on extensive clear cuttings. It is hoped that a review of conditions on areas when cut over, as against the development of new stands over a 10 to 15-year period will account for numerous exceptions and contradictions to the broad general pattern.

Mowing

Reexamination of areas on which hardwood advance reproduction was mowed, prior or subsequent to removal of part or all of the overstory, did not indicate any marked superiority of mowed as compared with unmowed areas. Analysis of the field data may show a slightly larger and better formed sapling stand, but hardly sufficient to justify 3 to 19 man hours per acre (average approximately 12).

Girdling

In northern New England, girdling wolf and other low quality hardwoods has been undertaken primarily to benefit softwood species. Girdling on extensive areas on the Green Mountain National Forest was

an exception, as the objective was establishment of high quality, even-aged northern hardwood stands. Fifteen years after treatment of an experimental cutting area, the new stand following girdling is markedly superior to the adjacent ungirdled area. The girdled area is better stocked with a higher ratio of larger sugar maple and yellow birch, and fewer weed species (mountain maple and striped maple) than the ungirdled area.

Birch Dieback.

Following a brief training and orientation session at Bartlett and vicinity, the Bureau of Entomology and Plant Quarantine and Bureau of Plant Industry, together with other public agencies, initiated a thorough but necessarily extensive survey of the birch situation in New York and the three northern New England states. Four 2-man teams, an entomologist and a pathologist, spent several weeks on this project. Findings and conclusions are not as yet available. So-called dieback conditions such as are present in northern and eastern Maine and the Maritime Provinces, where on extensive areas practically all older stands of birch are dead or dying, have not developed in New Hampshire and Vermont. In view of the improved conditions during 1947 and 1948, and probably 1949, as reported by Maine entomologists, the mature birch in these two states should not be written off at this time.

Beech Scale

During this past quarter, beech scale was found in Waterville Valley, the first outbreak on the west side of the Presidential Range. During the same period, scale was reported for the first time in Vermont on ex-Governor Proctor's estate in Proctor, Vermont. Probably the scale on these ornamental beech was brought in on nursery stock about 30 years ago.

In conjunction with the birch survey, the entomologists and pathologists scouted the region to more exactly determine the extent and severity of the beech scale and *Nectria* (*N. ditissima*).

Apparently, the 1948-1949 build-up of scale in the White Mountains is contrary to the trend in eastern Maine, New Brunswick and Nova Scotia. The more easterly outbreak showed an appreciable decline following the extremely cold winter of 1947-1948. The Canadians largely attribute this to low temperatures (-32°F . supposedly lethal) which in many localities knocked the scale back to snowline. The September examination of an area near Grand Lake Stream, Maine, on which frequent periodic and detailed information has been obtained from 1933 through 1943, shows that after the build-up in the late 30's and early 40's, scale and *Nectria* had noticeably declined over the past six-year period. Although a poor beech stand by White Mountain standards, the trees had largely recovered and mortality was not excessive. Most of the trees at some period had been infected with *Nectria* following scale. Contrary to the opinion of some pathologists, *Nectria* is not necessarily the forerunner of death.

Messrs. Brown and Hansbrough of the Forest Insect Laboratory and Forest Pathology offices in New Haven, are planning a comprehensive

study of beech scale and Nectria. As with spruce budworm, control through forest management will be a major consideration. Full use will be made of past and future timber cutting operations where beech is an important component of the residual stand. Based on preliminary reconnaissance and available information, the Bartlett Forest and other sections of the White Mountains in the vicinity will apparently provide the best location for undertaking this work. Having no precedent, there is no assurance of control through forest management. However, Dr. Balch, one of the outstanding Canadian authorities, feels that such a program offers an excellent possibility of practical control. Dr. Balch has carefully followed the progress of scale-Nectria through the Maritime Provinces for the past 25 years. Losses have been largely confined to mature and overmature beech more than 12" D.b.h. This in part accounts for his belief in the possibilities of control through moderate forest management practices.

SPRUCE-FIR MANAGEMENT AND BUDWORM STUDY AREAS

Very little factual data are available on the degree of cutting compliance with marking on commercial sized operations. Although not a consideration in the working plan, it was hoped that an analysis of marking tallies, cruises and recruises of the study areas would indicate how closely cutting conformed to marking. However, in juggling data from 100% marking tallies, cruises of 12 to 25% and less intensive recruises, there apparently were too many sources of error. Probably due to compensating errors, some of the results were fairly plausible; others failed entirely to provide a true indication of actual conditions. Until proven otherwise, we subscribe to the local guesstimate of 10% losses.

